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REVIEWS

A History of British Fishes. By William Yarrell, V.P.Z.S., F.L.S. Illustrated by nearly 400 wood-cuts. 2 vols. Van Voorst.

We announced Mr. Yarrell's work in our columns on the appearance of the first number, but we have forborne any further notice, from the feeling, that we could not do it justice by speaking of it in separate parts. It is now complete, in every sense of the word; and we congratulate ourselves on that patience, which has enabled us to view it as a whole. It is intended to form a continuation of the labours of Bewick, whose beautiful wood-cuts, occasional vignettes, and *naïve* descriptions, will ever be ranked among our standard works. Mr. Yarrell's was rather a bold undertaking, considering the high esteem in which his predecessor is held; but his powers as a naturalist, and his long devotion to ichthyology in all its branches, made it less formidable to him than to most others; and we can safely say, to all those who already possess Bewick's works, that their collection is not complete without adding Mr. Yarrell's fishes to the birds and beasts. So much for his having fulfilled the pledge he made as successor to Bewick —we now come to consider him in even a higher character, that of a scientific naturalist, independent of those who went before, or who will come after him; and we feel a positive pleasure, amid the inundation of trash and superficiality which flows from our press on the subject, in submitting to our readers a brief account of the 'History of British Fishes.' In doing this, however, we feel it our duty to select such passages as will suit the general, as well as the scientific reader, for it has evidently been the wish of the author to render himself acceptable to both.

The descriptions of species are 226 in number, but, as several of them are figured in various stages of growth, the representations amount to 240—all made under the superintendence of the author; besides which, there are more than 140 vignettes of modes of fishing, boats, nets, &c. foreign and English. All these are well executed, though some will merit more especial notice than others; most of them are designed from the dead fish, which, perhaps, is better for the naturalist than the amateur, as the characters become more distinct; and various parts are separately given for the sake of the anatomist. The classification is that of Cuvier in his 'Regne Animal,' and 'Histoire Naturelle des Poissons.' A short Introduction precedes the body of the work, and in the management of this lay one of Mr. Yarrell's chief difficulties. The taste of our public, accustomed to admire the miracles of nature, as contained in the economy of animals, has been vitiated by treatises dwelling upon these alone; so that an author, who goes methodically to his task, first describes the frame-work, or skeleton of a fish, then the muscles, or parts supported by that frame-work—proceeds to the different functions of the internal organs, and, lastly, comes to the form and colouring, has no chance of being read. Mr. Yarrell, however, has avoided the appearance of a formidable discussion, and distributes his solid information with so much tact, as to hide its dulness from the general reader. He is far, however, from confining it to the Introduction alone, but so mingles it with the other parts of his work, that it comes upon us insensibly, and we feel convinced that many will peruse these valuable passages with pleasure, who would have rejected them, had they been contained in a more collected or imposing form. To begin with the Introduction:—after speaking of the external characters, such as shape, scales, fins, &c., Mr. Yarrell observes of the gills—

"That they (or the branchiæ) possess complex powers, and are capable of receiving the influence of oxygen, not only from that portion of atmospheric air which is mixed with the water, but also directly from the atmosphere itself. When fishes, confined in a limited quantity of water, are prevented, by any mechanical contrivance, from taking in atmospheric air at the surface, they die much sooner than others that are permitted to do so. The consumption of oxygen, however, is small, and the temperature of the body of fishes that swim near the bottom, and are known to possess but a low degree of respiration, is seldom more than two or three degrees higher than the temperature of the water at its surface. * * Physiologists have shown, that the quantity of respiration is inversely as the degree of muscular irritability. It may be considered as a law, that those fish which swim near the surface of the water have a high standard of respiration, a low degree of muscular irritability, great necessity for oxygen, die soon, almost immediately when taken out of water, and have flesh prone to rapid decomposition: mackerel, salmon, trout, and herrings, are examples. On the contrary, those fish that live near the bottom of the water have a low standard of respiration, a high degree of muscular irritability, and less necessity for oxygen; they sustain life long after they are taken out of the water, and their flesh remains good for several days: carp, tench, eels, the different sorts of skate, and all the flat fish may be quoted."

An anecdote, reported on the authority of the indefatigable naturalist of Cornwall, Mr. Couch, is worthy of remark, as it relates to that peculiar organ in fishes, the air-bladder.

"I have often seen (says that gentleman) small fishes of this family (Gadidæ) caught and turned free again, when they have been unable to descend through the water, notwithstanding their utmost efforts, which have not been deficient in vigour. When, in the early part of last summer, I was prepairing a bottle of fishes, I pierced a Lesser Forked Beard, with a pointed probe, through the mouth into the air bladder, in order to render the fish small enough to enter the bottle; but, being obliged, also, to squeeze it with some force for that purpose, the dorsal fin became distended with air—a circumstance that would direct our attention to the air bladder, as the source of the air distending the fins and tunic of the eyes in the gadidæ."

In continuation, Mr. Yarrell adds:—

"The analogy to the air cells in birds, and the passage of air from them into the bones and limbs, is too obvious to be unobserved, and will give interest to further investigation."

We will also cite a useful hint respecting the power of distinguishing the sexes:—

"Except in the cartilaginous sharks and rays, there are no very obvious external signs by which the sexes in fishes can be distinguished. As in the higher animals, however, the respiratory organs occupy more space in the males than in the females, and, on the other hand, the abdomen is larger in the females than in the males; the males may therefore be known from the females by their somewhat sharper or more pointed head, the greater length of the gill-cover, and the body, from the dorsal fin downwards, being not so deep, compared with the whole length of the fish."

Among the romances with which natural history is too often obscured, we imagine that our readers have heard of dry mud suddenly teeming with life, and other apparently spontaneous productions. After relating, on the authority of Colonel Sykes, that in the ponds in the East Indies, which have become perfectly dry, and the mud hard, the next rainy season will find them full of fish, although wholly unconnected with any stream or passage by which they could be admitted, Mr. Yarrell says—

"The solution appears to me to be this: the impregnated ova of the fish of one rainy season are left unhatched in the mud through the dry season, and, from their low state of organization as ova, the vitality is preserved till the occurrence and contact of the rain and the oxygen of the next wet season, when vivification takes place from their joint influence. If this solution of the problem be the true one, it points at once to what perhaps may be effected after a few experiments—namely, the artificial fecundation of the roe, the drying of that roe (or of other roe naturally impregnated,) sufficiently to prevent decomposition, and its possible transportation to, and vivification in, distant countries."

We now come to the work itself, at the head of which is the great perch family (Percidæ). The type of it is certainly the most splendidly-coloured of all our British fishes, and caught in a mill-pool which foams over a gravelly bed, we do not know a more brilliant reward to the angler for all his patience and skill, than a perch of a pound and a half. The figure in Mr. Yarrell's book is good, but we were rather disappointed, that among the observations we did not find it recorded, that sometimes the membrane of the first dorsal fin ends so close to the second, that it is hardly possible to say that they are separate. Cuvier, in his great work on fishes, gives such a contiguity as a general character, but adds, that there are some individuals which have only thirteen rays to the first dorsal fin, and in this case the two dorsals are more distant from each other. This description perfectly accords with our own experience after the examination of many perches, and we wonder that Mr. Yarrell, who has spared no pains to make his details complete, should have suffered it to escape him.

The authority of Mr. Couch is again used in treating of the sub-genus Serranus, and we give his words:—

"It keeps in the neighbourhood of rocks, not far from land: and it is singular, that the spasm, which seizes this fish when taken, never passes off—hence it is found, long after death, in a state of rigidity and contortion, with the fins preternaturally erect."

From the description of the striped red mullet we quote the following passage concerning *cirri* in general:—

"In connexion with their food, and the search made for it, the long cirri, articulated to the under jaw, require to be noticed. These cirri are generally placed near the mouth, and they are mostly found in those fishes that are known to feed very near the bottom. In dissecting these appendages, in the mullet, the common cod, and others, I found them to consist of an elongated and slender flexible cartilage, invested by numerous longitudinal, muscular, and nervous fibres, and covered by an extension of the common skin. The muscular apparatus is most apparent in the mullet, the nervous portion most conspicuous in the cod. These appendages are to them, I have no doubt, delicate organs of touch, by which all the species provided with them are enabled to ascertain, to a certain extent, the qualities of the various substances with which they are brought in contact, and are analogous in function to the

beak, with its distribution of nerves, among certain wading and swimming birds, which probe for food beyond their sight; and may be considered another instance among the many beautiful provisions of nature, by which, in the case of fishes feeding at great depths, where light is deficient, compensation is made for consequent imperfect vision."

The air-bladder in fishes was mentioned in the Introduction, as we have already noticed, but it is too interesting a feature in ichthyology to be lightly passed over, and accordingly we find a further description in the account of the Red Gurnard:—

"The air-bladders are usually made up of two membranes. The inner one has a moist, smooth, and, apparently, a secreting surface; the outer membrane is fibrous in its structure, and a portion of the bladder is, in some species, invested by a fold of the peritoneum; the three coats, when present, are nourished by blood vessels, which are very apparent. The air-bladder does not occur in all fishes: some fishes, and those principally that live near the bottom of the water, are without any. Among those species that have an air-bladder, many appear, on the closest examination, to have no canal or tube by which the air, with which the bladder is more or less distended, can escape. Muscles for compressing the air-bladder are obvious in some species, and wanting in others, yet the air-bladder apparently performs the same service in all. * * Priestley and Fourcroy determined the gas in the [air-bladder of the] carp to be nearly pure nitrogen; other chemists found the air in different fishes to consist of nitrogen, oxygen, and carbonic acid; the nitrogen in greater proportion, and the oxygen in smaller, than in atmospheric air. In the air-bladder of marine fishes the oxygen is in excess, varying from forty to eighty-seven per cent., depending on the depth at which the different species usually remained. * * The air thus found in these bladders, however variable in its nature, is believed to be secreted by the inner lining membrane, and, in some instances, by a red body, which appears to form part of the walls of the air-bladder itself, and is made up of minute blood-vessels arranged between the membranes. * * That one use of these air-bladders to the fishes possessing them, is to enable them to alter their specific gravity with reference to that of the fluid they inhabit, seems almost certain. * * In other respects, however, the function is quite as anomalous and uncertain as the quality of its contained gas. Our two red mullets have no swimming bladder, yet they appear in the water to possess all the power of the Indian or American species, which are well provided with them. The two British species of mackerel, hereafter to be described, both swim near the surface of the water, with the same apparent swiftness and ease; one has a swimming bladder, the other none. * * M. Agassiz, in dissecting a species of Lepisosteus, a fresh water fish of the rivers of America, found the air-bladder composed of several cells, with a canal proceeding upwards into the pharynx, and ending in an elongated slit, with averted edges, resembling a glottis or tracheal aperture. However obvious may be the relations of structure, it is still difficult to believe there can be any analogy in function, when it is recollected that one-fourth of the fishes known are entirely without air-bladders, and that two-thirds of the other three-fourths have neither canal nor aperture for external communication, but that all are provided with gills."

We were well pleased to read these observations, because love of novelty being as strong among the greater part of naturalists as among other people, a considerable sensation had been excited by the discovery of M. Agassiz, and it was reported that that eminent person had upset all the great rules hitherto laid down, by finding lungs in fishes. On our mentioning this to one of the first of the continental comparative anatomists, his reply was a cool "*Nous verrons.*" For ourselves, we are always very cautious in believing that which looks like inconsistency in nature.

The figure of the Sapphirine Gurnard seems to be flying in reality, it is so spiritedly drawn, but we must remark, that in all cases we should have been better satisfied if a mere outline section had been given (where possible) of the natural size of each fish, that we might have formed a better idea of their relative proportions. Admirable as the figures are in Mr. Yarrell's Ichthyology, the conger eel and the pride, the gudgeon, the shark, and the stickleback, so nearly occupy the same extent of paper, that a novice would hardly suppose there was so much real difference between them. It may be urged that the measurement is given in the description, but we are convinced that the eye in such matters goes before the reason, and makes the strongest impression.

In speaking of the sticklebacks, Mr. Yarrell quotes his own interesting account, as given in Mr. Loudon's *Magazine of Natural History*, which, if we mistake not, was one of the first proofs which Mr. Yarrell gave to the public of his skill as an ichthyologist. As we cannot cite the whole passage concerning these fierce little animals, we shall give the preference to that which has never before been published.

"The colour of these, and some other small fishes, was influenced not only by the colour of the earthenware or other vessel in which they were kept, but also modified by the quantity of light to which they were exposed; becoming pale when placed in a white vessel in darkness, even for a comparatively short time, and regaining their natural colour when placed in the sun. From these circumstances, observed also in some species of other genera, Dr. Stark is led to infer, that fishes possess, to a certain extent, the power of accommodating their colour to the ground or bottom of the waters in which they are found. The final reason for this may be traced to the protection such a power affords to secure them from the attacks of their enemies, and exhibits another beautiful instance of the care displayed by nature in the preservation of all her species. Dr. Stark often observed, that on a flat, sandy coast, the flounders were coloured so very much like the sand, that, unless they moved, it was impossible to distinguish them from the bottom on which they lay."

It is not only the soil, but the food also, which influences the colour of fishes; and not only have we seen them vary in the above manner, but a fish transported, to all appearance, to another stream of equal depth, and running over the same sort of bed, will, from the difference of its nourishment, assume another colour.

A description of the teeth of fishes is interwoven with that of the Gilt-head (*Chrysophrys aurata*), and from it we copy those parts which are most generally intelligible.

"The forms of the teeth are not less varied than their position, and require various names. The most common form is that of an elongated cone, either straight or curved. When these conical teeth are small and numerous, they are compared to the points of the cards used for carding wool or cotton; and they are sometimes so slender, yet so dense from their numbers, as to resemble the pile of velvet or plush; and often, from their very minute size, their presence is more readily ascertained by the finger than by the eye. Some fishes have, in the front of the jaws, flat teeth, with a cutting edge, like a true incisor: others have them rounded or oval; they are then most frequently planted in rows, and adapted to bruise or crush the various substances with which they are brought in contact. All the teeth of fishes are simple, each originating in its own simple pulpy germ. Whatever the form of the tooth, it is produced by successive layers, as in the mammalia; but the growth is not directed downwards to form a root; there is no alveolar cavity; the tooth consists only of that part which is usually called the crown, and it seems rather to be a production of the surface of the bone than of the interior. The renewal of the teeth in fishes seems to take place at uncertain periods, apparently with some reference to the accidental wants of the animal; the new tooth sometimes grows beneath, sometimes at the side, or behind, or before the old teeth, which are loosened at their attachment, not worn down, and thus thrown off."

To the figure of the Spanish Bream we really must solicit attention as a work of art; it is only a copy of the plate belonging to the great work of MM. Cuvier and Valenciennes, but it is a beautiful proof of the perfection to which woodcuts may be carried; the clear depth of the foreground, the minuteness, yet perfect distinctness of the scales, and the delicacy of the background, make it an admirable specimen of what may be done with such a material. We select the following receipt for cooking a Sea Bream, as a hint to more than naturalists, for it may be profitably applied to any other dry fish.

"When thoroughly cleaned, the fish should be wiped dry, but none of the scales should be taken off. In this state it should be broiled, turning it often, and if the skin cracks, flour it a little to keep the outer case entire. When on table, the whole skin and scales turn off without difficulty, and the muscle beneath, saturated with its own natural juices, which the outside covering has retained, will be found of good flavour."

The praise which we have just bestowed on the figure of the Spanish Bream, may be extended to that of the Mackerel, which is an equally perfect representation of a fish whose scales are not visible; the streaks, the fin half in the water, and even the silvery appearance, will not allow us to regret either colour, steel, or copper. Of the abundance of this fish Mr. Yarrell's statement will give some idea to our readers:—

"At Brighton, in June of the same year (1808), the shoal of mackerel was so great, that one of the boats had the meshes of her net so completely occupied by them, that it was impossible to drag them in, the fish and nets therefore, in the end, sunk together; the fishermen thereby sustaining a loss of nearly 60*l.*, exclusive of what the cargo, could it have been got into the boat, would have produced. * * The value of the catch of sixteen boats from Lowestoffe, on the 30th of June (1821), amounted to 5252*l.*; and it is supposed that there was no less an amount than 14,000*l.* altogether realized by the owners and men concerned in the fishery of the Suffolk coast. In March, 1833, on a Sunday, four Hastings' boats brought on shore 10,800 mackerel, and the next day, two boats brought 7000 fish."

The necessity for small figures, and the want of a linear section, as before alluded to, make the figure of the tunny, which is a very large fish, but little bigger than that of the stickleback. The method of catching them is told in a very lively manner, and the mode of preparing them for the table; but neither in this, nor in any other work, do we find it stated that the flesh of the head and shoulders (expressing ourselves in the common terms used for cod,) is very far superior to the rest of the fish; indeed, at many of the tables of the higher classes of Portuguese, no other part of the fresh fish would be admitted. To the manner of catching the Bonito we can add, that sailors constantly harpoon them, and that our own experience teaches us that nothing can render their dry, hard, and insipid flesh agreeable to the palate, even when fresh provisions have not been tasted for many weeks. It always seemed to us to be like chewing so much stale hay.

Of the pretty striped Pilot-fish the following is a curious anecdote:—

"In January 1831, the *Peru*, Graham, master, put into Plymouth, on her voyage from Alexandria for London, after a passage of eighty-two days. About two days after she left Alexandria, two pilot fish (*Gasterosteus ductor*) made their appearance close alongside the vessel, were constantly seen near her during the homeward voyage, and followed her into Plymouth. After she came to an anchor in Catwater, their attachment appeared to have increased; they kept constant guard to the vessel, and made themselves so familiar, that one of them was actually captured by a gentleman in a boat alongside, but, by a strong effort it escaped from his grasp and regained the water. After this the two fish separated; but they were both taken the same evening,

and, when dressed the next day, were found to be excellent eating."

Concerning the Black Fish, it will be well to correct a mistake, by copying Mr. Yarrell's own words:—

"This fish, first described as British by Borlase, from the papers of Mr. Jago, of East Looe, has been a stumbling-block to naturalists for the greater part of a century. Stewart and Turton fixed it in the genus Perca, under the name of P. nigra; and Stewart supposed it a variety of the Ruffe, in which opinion he was joined by Dr. Fleming. All this, however, is to be traced to an original mistake of the Cornish historian, who, in copying Jago's description, represents it as three-fourths of an inch broad, which would make it as slender as a tapefish, where he should have said three or four inches, which was the exact dimensions of my specimen."

Concerning the excellence of the Opah for eating, we can add our own testimony to that of Mr. Yarrell; it is much esteemed on tropical coasts, and its flesh is rich, juicy, and highly flavoured. Of the size of the grey mullet in the same countries, Mr. Yarrell does not seem to be aware, or we think he would have mentioned it; we have known them to be upwards of three feet in length, and affording an exquisite repast. Of that curious fish called by the various names of Fishing-frog, Angler, Sea-devil, &c., we must cite Mr. Yarrell's description:—

"In its appetite this fish is most voracious; and as it is not a rapid swimmer, possessing but little power in its pectoral fins, it is supposed to be obliged to have recourse to art in order to satisfy its appetite. Upon the head, as will be seen in the figure, are two slender, elongated appendages, the first of these broad and flattened towards the end, and having, at this dilated part, a shining silvery appearance. These elongated filaments are curiously articulated at the base, with the upper surface of the head. They have great freedom of motion in any direction, the first filament more especially, produced by numerous muscles, amounting, according to M. Bailly, to twenty-two." The figure in Mr. Yarrell's vignette "shows the manner in which these two elongated appendages are attached, as well as the kind of motion of which, by the action of various muscles, they are capable. The first is articulated by a process, resembling two links of a chain, by which universal motion is obtained: the second is more limited in its action, and appears, except as far as flexibility may assist it, to be only capable of being brought forward or backward. These elongated shafts are formed of bone, covered by the common skin; and, as the soft parts are abundantly supplied with nerves, they may also serve the angler (or fisher) as delicate organs of touch. The uses to which they are applied are singular. While couching close to the ground, the fish, by the action of its ventral and pectoral fins, stirs up the sand or mud. Hidden by the obscurity thus produced, it elevates these appendages, moves them in various directions, by way of attraction as a bait, and the small fishes, approaching either to examine or to seize them, immediately become the prey of the fisher."

We must here close our notice for the present week.

Mr. Midshipman Easy. By the Author of 'Peter Simple.' 3 vols. Saunders & Otley.

If Captain Marryat be one of the most prolific of novelists, even in these days when three volumes are produced with little more thought or exertion than a shake of the head and a scratch of the pen, he is also one of the pleasantest. He has a quiet racy humour of his own, which never forsakes him, even when hurried along by the action of his busy stories—he manages a plot magnificently, by audaciously flying in the face of probabilities—he pilots his heroes, with unperturbable nerve, through whirlpools and breakers, which would confound and swamp any Palinurus a whit less confident; in short, he seems to share the luck of the domestic quadruped, who, tumble whence she will, always alights on her feet, ready for mischief. Here he is again, as hearty as ever; and those who love a stirring story and a cheery laugh, cannot do better in this dull season than take a cruise with Mr. Midshipman Easy!

The parents of our hero are sketched with a careless but quaint pencil; Mr. Easy, senior, (*Squire* Easy, the elder novelists would have styled him,) being a liberty and equality gentleman, who inoculates his son, early in life, with his own impossible doctrines, and the inextinguishable desire of "arguing the thing out." In the old gentleman's case, the end of these is lunacy—(his death, to speak for a moment seriously, is monstrously conceived and disagreeably managed); in the young man, this somewhat pragmatical disposition combined with an ardent temperament, and cased in an athletic well-proportioned body, leads him into innumerable adventures, and furnishes him at every chapter with a fresh "yarn to tell the governor." "The child," we all know, "is father of the man;" in the following little scene we have the *buds* of some of Mr. Midshipman Easy's after freaks and propensities:—

"'Have you no idea of putting the boy to school, Mrs. Easy?' said Dr. Middleton, who had been summoned by a groom with his horse in a foam to attend at Forest Hill, the name of Mr. Easy's mansion, and who, upon his arrival, had found that Master Easy had cut his thumb. One would have thought that he had cut his head off by the agitation pervading the whole household,—Mr. Easy walking up and down very uneasy, Mrs. Easy with great difficulty prevented from syncope, and all the maids bustling and passing round Mrs. Easy's chair. Everybody appeared excited except Master Jack Easy himself, who, with a rag round his finger, and his pinafore spotted with blood, was playing at bob-cherry, and cared nothing about the matter.

"'Well, what's the matter, my little man?' said Dr. Middleton, on entering, addressing himself to Jack, as the most sensible of the whole party.

"'Oh, Dr. Middleton,' interrupted Mrs. Easy, 'he has cut his hand; I'm sure that a nerve is divided, and then the lock-jaw—'

"The Doctor made no reply, but examined the finger: Jack Easy continued to play bob-cherry with his right hand.

"'Have you such a thing as a piece of sticking-plaster in the house, madam?' observed the Doctor, after examination.

"'O yes:—run, Mary—run, Sarah!' In a few seconds the maids appeared, Sarah bringing the sticking-plaster, and Mary following with the scissors.

"'Make yourself quite easy, madam,' said Dr. Middleton, after he put on the plaster, 'I will answer for no evil consequences.'

"'Had I not better take him up stairs, and let him lie down a little?' replied Mrs. Easy, slipping a guinea into the Doctor's hand.

"'It is not absolutely requisite, madam,' said the Doctor; 'but at all events he will be kept out of more mischief.'

"'Come, my dear, you hear what Dr. Middleton says.'

"'Yes, I heard,' replied Jack; 'but I sha'n't go.'

"'My dear Johnny—come, love—now do, my dear Johnny.'

"Johnny played bob-cherry, and made no answer.

"'Come, Master Johnny,' said Sarah.

"'Go away, Sarah,' said Johnny, with a backhander.

"'Oh! fie, Master Johnny,' said Mary.

"'Johnny, my love,' said Mrs. Easy in a coaxing tone, 'come now—will you go?'

"'I'll go in the garden and get some more cherries,' replied Master Johnny.

"'Come, then, love, we will go into the garden.'

"Master Johnny jumped off his chair, and took his mamma by the hand.

"'What a dear, good, obedient child it is!' exclaimed Mrs. Easy: 'you may lead him with a thread.'

"'Yes, to pick cherries,' thought Dr. Middleton."

Johnny is sent to school, where he proves little more manageable than we have just seen him; from thence, at his own instance, is transferred to a jewel of a captain—the very man to manage such a youngster, who disabuses him of his high-flying notions, by kindness: the manner in which the boy is entrapped into subordination is, to be sure, somewhat overstrained; but we swallow its improbabilities for the sake of a character to whom we are shortly afterwards introduced, black Mesty, who, with his half negro half Irish brogue, his cool thirst for blood, picked up in a campaign among the Ashantees, keeps the intrigue of the story alive, and makes us alternately laugh and shudder, till we see him fairly anchored down as the Major Domo of Forest Hill. Easy gets into innumerable squabbles and straits—makes an enemy of the boatswain, by practically enforcing his favourite maxim of duty before decency, and stealing his nether garments—takes a poor little middy under his special protection, by thrashing his tyrant—is thrown by his headstrong self-will on board a captured Spanish vessel, and exposed to fearful hardships, whence his own coolness, and Mesty's cunning, extricate him most adroitly: and in the course of which, the seed of the love episode of the tale is sown—gets back to his ship after many moving adventures, and, shortly after coming on board, becomes one of the high-contracting parties in a duel, which is arranged, our readers will confess, on a somewhat new principle:—

"Mr. Talboys then addressed Mr. Gascoigne, taking him apart while the boatswain amused himself with a glass of grog, and our hero sat outside, teazing a monkey.

"'Mr. Gascoigne,' said the gunner, 'I have been very much puzzled how this duel should be fought, but I have at last found it out. You see that there are *three* parties to fight; had there been two or four there would have been no difficulty, as the right line or square might guide us in that instance; but we must arrange it upon the *triangle* in this.'

"Gascoigne stared; he could not imagine what was coming.

"'Are you aware, Mr. Gascoigne, of the properties of an equilateral triangle?'

"'Yes,' replied the midshipman, 'it has three equal sides—but what the devil has that to do with the duel?'

"'Everything, Mr. Gascoigne, replied the gunner; 'it has resolved the great difficulty: indeed, the duel between three can only be fought upon that principle. You observe,' said the gunner, taking a piece of chalk out of his pocket, and making a triangle on the table, 'in this figure we have three points, each equidistant from each other; and we have three combatants—so that placing one at each point, it is all fair play for the three: Mr. Easy, for instance, stands here, the boatswain here, and the purser's steward at the third corner. Now, if the distance is fairly measured, it will be all right.'

"'But then,' replied Gascoigne, delighted at the idea, 'how are they to fire?'

"'It certainly is not of much consequence,' replied the gunner, 'but still, as sailors, it appears to me that they should fire with the sun; that is, Mr. Easy fires at Mr. Biggs, Mr. Biggs fires at Mr. Easthupp, and Mr. Easthupp fires at Mr. Easy, so that you perceive that each party has his shot at one, and at the same time receives the fire of another.' * *

"The parties then repaired to the spot with two pairs of ship's pistols, which Mr. Talboys had smuggled on shore; and, as soon as they were on the ground, the gunner called Mr. Easthupp out of the cooperage. * * Easy took his station, the boatswain was put into his, and Mr. Easthupp, who was quite in a mystery, was led by the gunner to the third position.

"'But, Mr. Talboys, said the purser's steward, 'I don't understand this—Mr. Easy will first fight Mr. Biggs, will he not?'

"'No,' replied the gunner, 'this is a duel of three. You will fire at Mr. Easy, Mr. Easy will fire at Mr. Biggs, and Mr. Biggs will fire at you. It is all arranged, Mr. Easthupp.'

"'But,' said Mr. Easthupp, 'I do not understand it. Why is Mr. Biggs to fire at me? I have no quarrel with Mr. Biggs.'

"'Because Mr. Easy fires at Mr. Biggs, and Mr. Biggs must have his shot as well.'

"'If you have ever been in the company of gentlemen, Mr. Easthupp,' observed Gascoigne, 'you must know something about duelling.'

"'Yes, yes, I've kept the best company, Mr. Gascoigne, and I can give a gentleman satisfaction; but'—

"'Then, sir, if that is the case, you must know that your honour is in the hands of your second, and that no gentleman appeals.'

"'Yes, yes, I know that, Mr. Gascoigne, but still I've no quarrel with Mr. Biggs, and therefore Mr. Biggs, of course you will not aim at me.'

"'Why, you don't think that I'm going to be fired at for nothing,' replied the boatswain; 'no, no, I'll have my shot any how.'

"'But at your friend, Mr. Biggs?'

"'All the same, I shall fire at somebody; shot for shot, and hit the luckiest.'

"'Vel, gentlemen, I purtest against these proceedings,' replied Mr. Easthupp; 'I came here to have satisfaction from Mr. Easy, and not to be fired at by Mr. Biggs.'

"'Don't you have satisfaction when you fire at Mr. Easy,' replied the gunner; 'what more would you have?'

"'I purtest against Mr. Biggs firing at me.'

"'So you would have a shot without receiving one,' cried Gascoigne; 'the fact is, that this fellow's a confounded coward, and ought to be kicked into the cooperage again.'"

Mr. Biggs (the boatswain) is wounded in this precious "passage of arms," and Easy and his familiar Gascoigne slink out of the way for fear of consequences—are wrecked on the coast of Sicily, and somehow or other, by happy chance, stumble upon the identical Spanish lady who is to prove Mr. Midshipman's "bright particular star." Here we come upon a bit of Italian romance interwoven into this most changeable and careless of stories. The next scenes are laid at Tetuan,—at which delectable place Jack shows signs of increased wisdom, in preventing his familiar Gascoigne from getting into the serious scrape of committing matrimony with a Moorish girl—with whom he had fallen in love, something after the fashion of the Arabian Nights. We must try to give our readers some notion of the scheme to which Easy resorted, premising, in the first instance, that Captain Hogg was master of the transport in which Jack and his friend had sailed, and that the said Captain had been taken captive by the flaxen curls and brighter dollars of Miss Julia Hicks, the Vice Consul's sister, to the violent displeasure of her brother.

"At last Jack planned a scheme which he thought would succeed, and which would be a good joke to tell the governor. He therefore appeared to consent to Gascoigne's carrying off his little Moor, and they canvassed how it was to be managed. Jack then told Gascoigne that he had hit upon a plan which would succeed. 'I find,' said he, 'from Captain Hogg, that he has an intention of carrying off Miss Hicks, and when I sounded him as to his having a lady with him, he objected to it immediately, saying, that he must have all the cabin to himself and his intended. Now, in the first place, I have no notion of giving up the cabin to Miss Hicks or Mrs. Hogg. It will be very uncomfortable to be shut out, because he wishes to make love; I therefore am determined that he shall not take off Miss Hicks. * * *

"'Look you, Ned, if you wish to carry off your little Moor there is but one way, and that is a very simple one: leave her a dress of Miss Hicks's when you go there to-morrow night, and tell her to slip down at dusk, and come out of the house: all the danger will be in her own house, for as soon as she is out, she will be supposed to be the vice-consul's sister, and will not be observed or questioned. I will look out for, and bring her on board instead of Miss Hicks. Hogg will have the brig under weigh, and will be too happy to make all sail, and she shall lock the cabin inside, so that the mistake shall not be discovered till the next morning, and we shall have a good laugh at Captain Hogg.'"

Our hero next seeks Captain Hogg, and, proving traitor to his friend, recommends to the Captain the substitution of the real for the counterfeit Miss Hicks, promising him in the morning "a fine laugh" at Gascoigne, as well as a fair-haired bride.

"Now it must be observed that the water and the bullocks, and the sheep and fowls, were all on board; and Mr. Hicks having received his money from Jack, had very much altered his manner; he was barely civil, for as he had got all he could out of our hero, he was anxious to get rid of him as well as of Captain Hogg. Our hero was very indignant at this, but as it would not suit his present views, pretended not to notice it—on the contrary, he professed the warmest friendship for the Vice Consul, and took an opportunity of saying that he could not return his kindness in a better way than by informing him of the plot which had been arranged. He then told him of the intended escape of his sister, and that he was the person intended to bring her off.

"'Infamous, by heavens!' cried the Vice Consul; 'I shall write to the foreign office on the subject.'

"'I think,' said Jack, 'it will be much better to do what I shall propose, which will end in a hearty laugh, and to the confusion of Captain Hogg. Do you dress yourself in your sister's clothes, and I will bring you off instead of her. Let him imagine that he has your sister secure: I will hand you down to the cabin, and do you lock yourself in. He cannot sail without my orders, and I will not sign the vouchers. The next morning we will open the cabin door and have a good laugh at him. Desire your boat to be off at daylight to take you on shore, and I will then make him proceed to Toulon forthwith. It will be a capital joke.' * *

"That night Gascoigne left one of Miss Hicks's many dresses with Azar, who agreed to follow his fortunes, and who packed up all the jewels and money she could lay her hands upon. Poor little child, she trembled with fear and delight. Miss Hicks smuggled, as she thought, a box of clothes on board, and in the box was her fortune of three hundred dollars. Mr. Hicks laughed in his sleeve, so did Jack; and every one went to bed with expectations that their wishes would be realized. After an early dinner Captain Hogg and Gascoigne went on board, both squeezing Jack's hand as if they were never to see him again, and looks of intelligence passed between all the parties. * *

"A little before dark, the boat was sent on shore from the brig, which was now under weigh, and Mr. Hicks, as had been agreed, said that he should go into the office and prepare the vouchers—that is, put on his sister's clothes. Miss Hicks immediately rose, and wishing our hero a pleasant voyage, as had been agreed, said that she should retire for the night, as she had a bad head-ache—she wished her brother good night, and went into her room to wait another hour, when our hero, having shoved off the boat to deceive the vice-consul, was to return, meet her in the garden, and take her off to the brig. Our hero then went into the office and assisted the Vice Consul, who took off all his own clothes and tied them up in a handkerchief, intending to resume them after he had gone into the cabin.

"As soon as he was ready, Jack carried his bundle and led the supposed Miss Hicks down to the boat. They shoved off in a great hurry, and Jack took an opportunity of dropping Mr. Hicks's bundle overboard. As soon as they arrived alongside, Mr. Hicks ascended and was handed by Jack down into the cabin: he squeezed Jack's hand as he entered, saying in a whisper, 'To-morrow morning what a laugh we shall have!' and then he locked the door. In the mean time the boat was hooked on and hoisted up, and Jack took the precaution to have the dead lights lowered that Mr. Hicks might not be able to ascertain what was going on. Gascoigne came up to our hero and squeezed his hand.

"'I'm so much obliged to you, Jack. I say, to-morrow morning what a laugh we shall have!'

"As soon as the boat was up, and the mainyard filled, Captain Hogg also came up to our hero, shaking him by the hand and thanking him; and he too concluded by saying, 'I say, Mr. Easy, to-morrow morning what a laugh we shall have!' * *

"We must leave the reader to imagine the effect of the next morning dénouement. Every one was in a fury except Jack, who did nothing but laugh. * *

"As for Gascoigne, it was no use reasoning with him, so it was agreed that he should have satisfaction as soon as they could get on shore again. Mr. Hicks was the most violent; he insisted that the vessel should return, while both Jack and the Captain refused, although he threatened them with the whole foreign office. He insisted upon having his clothes, but Jack replied that they had tumbled overboard as they pulled from the shore. He then commanded the mate and men to take the vessel back, but they laughed at him and his woman's clothes. 'At all events, I'll have you turned out of the service,' said he to our hero in his fury. 'I shall be extremely obliged to you,' said Jack—and Captain Hogg was so much amused with the Vice Consul's appearance in his sister's clothes, that he quite forgot his own disappointment in laughing at his intended brother-in-law. He made friends again with Jack, who regained his ascendency, and ordered out the porter on the capstern-head. They had an excellent dinner, but Mr. Hicks refused to join them, which however did not spoil the appetite of Jack or the Captain; as for Gascoigne, he could not eat a mouthful, but he drank to excess, looking over the rim of his tumbler as if he could devour our hero, who only laughed the more. Mr. Hicks had applied to the men to lend him some clothes, but Jack had foreseen that, and he was omnipotent. There was not a jacket or a pair of trousers to be had for love or money. Mr. Hicks then considered it advisable to lower his tone, and he applied to Captain Hogg, who begged to be excused without he consented to his marriage with his sister, to which Mr. Hicks gave an indignant negative. He then applied to Gascoigne, who had told him in a very surly tone to go to h—ll. At last he applied to our hero, who laughed, and said that he would see him d—d first. So Mr. Hicks sat down in his petticoats and vowed revenge. Gascoigne, who had drunk much and eaten nothing, turned in and went to sleep—while Captain Hogg and our hero drank porter on the capstern. Thus passed the first day, and the wind was famously fair—the bullocks lowed, the cocks crew, the sheep baa'd, and the Mary Ann made upwards of two hundred miles. Jack took possession of the other berth in the cabin, and his majesty's representative was obliged to lie down in his petticoats upon a topsail which lay between decks, with a bullock on each side of him, who every now and then made a dart at him with their horns, as if they knew that it was to him that they were indebted for their embarkation and being destined to drive the scurvy out of the Toulon fleet.

"We cannot enter into the details of the passage, which, as the wind was fair, was accomplished in ten days without the loss of a bullock. * *

"The fleet hove-to; Jack ran under the admiral's stern, lowered down his boat and went on board, showed his credentials, and reported his bullocks. The general signal was made, there was a fair division of the spoil, and then the Admiral asked our hero whether the Master of the transport had any other stock on board. Jack replied that he had not; but that having been told by the Governor of Malta that they might be acceptable, he had bought a few sheep and some dozen of fowls, which were much at his service, if he would accept of them. The Admiral was much obliged to the Governor, and also to Jack, for thinking of him, but would not, of course, accept of the stock without paying for them. He requested him to send all of them on board that he could spare, and then asked Jack to dine with him, for Jack had put on his best attire, and looked very much of a gentleman.

"'Mr. Easy,' said the flag-Captain, who had been looking at the transport with his glass, 'is that the master's wife on board?'

"'No, sir,' replied Jack; it's the Vice Consul.'

"'What, in petticoats! the Vice Consul?'

"'Yes, the Vice Consul of Tetuan. He came on board in that dress when the brig was under weigh, and I considered it my duty not to delay, being aware how very important it was that the fleet should be provided with fresh beef.'

"'What is all this, Mr. Easy?' said the Admiral; 'there has been some trick here. You will oblige me by coming into the cabin.'

Easy followed the Admiral and flag-Captain into the cabin, and then boldly told the whole story how he tricked them all. It was impossible for either of them to help laughing, and when they began to laugh it was almost as impossible to stop.

"'Mr. Easy,' said the Admiral at last, 'I do not altogether blame you; it appears that the Captain of the transport would have delayed sailing because he was in love—and that Mr. Gascoigne would have stayed behind because he was infatuated; independent of the ill-will against the English which would have been excited by the abduction of the girl. But I think you might have contrived to manage all that without putting the Vice Consul in petticoats.'

"'I acted to the best of my judgment, sir,' replied Jack very humbly.

"'And altogether you have done well. Captain Malcolm, send a boat for the Vice Consul.'

"Mr. Hicks was too impatient to tell his wrongs to care for his being in his sister's clothes: he came on board, and although the tittering was great, he imagined that it would soon be all in his favour, when it was known that he was a diplomatic. He told his story and waited for the decision of the Admiral, which was to crush our hero, who stood with the midshipmen on the lee-side of the deck; but the Admiral replied, 'Mr. Hicks, in the first place, this appears to me to be a family affair concerning the marriage of your sister, with which I have nothing to do. You went on board of your own free will in woman's clothes. Mr. Easy's orders were positive, and he obeyed them. It was his duty to sail as soon as the transport was ready. You may forward your complaint if you please; but as a friend, I tell you that it will probably occasion your dismissal, for these kind of pranks are not understood at the foreign office. You may return to the transport, which after she has touched at Mahon, will proceed again to Tetuan. The boat is alongside, sir.'

"Mr. Hicks, astonished at the want of respect paid to a Vice Consul, shoved his petticoats between his legs and went down the side amidst the laughter of the whole of the ship's company. Our hero dined with the Admiral, and was well received. He got his orders to sail that night for Minorca, and as soon as dinner was over, he returned on board, where he found Captain Hogg very busy selling his porter—Gascoigne walking the deck in a brown study—and Mr. Hicks solus abaft, sulking in his petticoats."

The foregoing extract has nearly exhausted our space. We must make room, however, for one more picture of a wholly different character.

"The Aurora flew before the gale, under her fore-sail and top-sails close reefed. The weather was now so thick that nothing could be observed twenty yards from the vessel; the thunder pealed, and the lightning darted in every direction over the dark expanse. The watch was called as soon as the sails were trimmed, and all who could went below, wet, uncomfortable, and disappointed.

"'What an old Jonah you are, Martin,' said Gascoigne.

"'Yes, I am,' replied he; 'but we have the worst to come yet, in my opinion. I recollect, not two hundred miles from where we are now, we had just such a gale in the Favourite, and we as nearly went down, when——'

"At this moment a tremendous noise was heard above, a shock was felt throughout the whole ship, which trembled fore and aft as if it was about to fall into pieces; loud shrieks were followed by plaintive cries, the lower deck was filled with smoke, and the frigate was down on her beam ends. Without exchanging a word, the whole of the occupants of the berth flew out, and were up the hatchway, not knowing what to think, but convinced that some dreadful accident had taken place.

"On their gaining the deck it was at once explained; the foremast of the frigate had been struck by lightning, had been riven into several pieces, and had fallen over the larboard bow, carrying with it the main topmast and jib-boom. The jagged stump of the foremast was in flames, and burnt brightly, notwithstanding the rain fell in torrents. The ship, as soon as the foremast and main topmast had gone overboard, broached-to furiously, throwing the men over the wheel and dashing them senseless against the carronades; the forecastle, the fore part of the main deck, and even the lower deck, were spread with men either killed or seriously wounded, or insensible from the electric shock. The frigate was on her beam ends, and the sea broke furiously over her; all was dark as pitch, except the light from the blazing stump of the foremast, appearing like a torch, held up by the wild demons of the storm, or when occasionally the gleaming lightning cast a momentary glare, threatening every moment to repeat its attack upon the vessel, while the deafening thunder burst almost on their devoted heads. All was dismay and confusion for a minute or two: at last Captain Wilson, who had himself lost his sight for a short time, called for the carpenter and axes—they climbed up, that is, two or three of them, and he pointed to the mizen-mast; the master was also there, and he cut loose the axes for the seamen to use; in a few minutes the mizen-mast fell over the quarter, and the helm being put hard up, the frigate payed off, and slowly righted. But the horror of the scene was not yet over. The boatswain, who had been on the forecastle, had been led below, for his vision was gone for ever. The men who lay scattered about, had been examined, and they were assisting them down to the care of the surgeon, when the cry of 'Fire!' issued from the lower deck. The ship had taken fire at the coal-hole and carpenter's store-room, and the smoke that now ascended was intense."

In the third volume, which we have now reached, adventures come "plenty as blackberries." The hero, as all heroes should, finds occasion to save his lady's life in the midst of a night attack made upon the house of her guardian, by a troop of liberated galley-slaves and a revengeful kinsman. In the following scenes, Mesty again figures with notable success, but we cannot extricate him from the story, so as to give our readers a fair idea of his parts, figure, and dialect. At length, after all Easy's ramblings and hair-breadth 'scapes, he returns home somewhat convinced of the necessity of discipline and subordination, marries the pretty Catholic, Agnes, showing to the last a touch of his quicksilver spirit, by going out to fetch his bride in a privateer. We wish we could make room for the fat lieutenant who accompanies him on this closing trip of his nautical adventures, a grotesque worthy of Mathews himself; but we have been obliged, perforce, to omit even passing mention of many other incidental scenes and characters, which fill this clever novel from first to last with life, and motion, and merriment.

The Saracens in Western Europe—[Invasions des Sarrazins en France, et de France en Savoie, &c.] Par M. Reinaud. Paris, Dondey-Dupré; London, Richter.

THERE was a time when Christendom was in imminent peril of being subdued by a people, whose language, religion, and habits, were foreign to Europe—when it was doubtful whether the Cross or the Crescent should crown the dome of St. Peter's, and uncertain whether "the valleys and rocks" of Europe should hear "the sound of the church-going bell," or the shrill cry of the muezzin calling to prayers. "But for the victory of Charles Martel," says Gibbon, "perhaps the interpretation of the Koran would now be taught in the schools of Oxford." Great obscurity hangs over the history of this interesting epoch, the invasions of the Saracens belong to the darkest as well as the most disastrous period in the annals of western Europe. The Mussulmans crossed the Pyrennees (A.D. 712,) when northern France was divided into the petty kingdoms of Neustria, Austrasia, and Burgundy, while the southern part of the country was shared between the Franks of Aquitain, and the Visigoths of Languedoc. Private and public wars, the clash of irreconcileable interests, national feuds, and all the evils arising from the dislocation of society, prevented any historian from furnishing us with a tolerably complete account of the perils that impended over Christendom. The horizon indeed clears after the accession of Pepin and Charlemagne, but their reigns occur when the Saracens were driven back beyond the frontiers. Darkness and the Mussulmans returned together under the descendants of Louis the Debonnaire; and the dangers struck down by the hammer of Martel appeared again in full life and vigour. M. Reinaud, impressed with the acknowledged deficiency of western materials for the history of this important crisis, has diligently examined the principal Arabian writers; and though his present collection scarcely equals in importance his work on the Crusades, it contains much that will interest, and more that will instruct the historical student.

The two oriental collections of M. Reinaud are more closely connected than they appear at a first glance. For a considerable time the greater part of the south of France was exposed to the Saracenic invasions. At a later period their effects were felt in Savoy, Piedmont, and Switzerland: the haughty Mussulmans occupied the best fortified places in the centre of Europe, from the gulf of Saint Trope's to the lake of Constance, from the Rhone and Mount Jura, to Mont-Ferrat and the plains of Lombardy. There can be no doubt that the memory of the Saracenic ravages mingled with the motives that led to the Crusades, and exasperated the rancorous hatred with which the followers of the Gospel assailed through so many ages the believers in the Koran.

We shall commence our examination of this important volume, by the Saracenic invasions over the Pyrennees, which terminated A.D. 759, when Pepin the Short recovered Narbonne, and the whole of Languedoc. The romantic history of Roderic the last of the Goths, and the conquest of Spain by the perfidy of Count Julian, are well known; but one great cause of the easy victories won by the Moors, has been for the first time explained to us by M. Reinaud.

One of the principal causes of the unexampled success of Tarik was, the support that his victorious troops received from the Jews, then very numerous in Spain. The Jews were impatient to take vengeance for the persecutions they had suffered from the Christians; and besides, they saw multitudes of their brethren enrolled in the Saracenic legions.

In less than two years Moussa and Tarík conquered Spain and Languedoc; the former had even planned a march through France and Germany to Constantinople, when he was recalled by court intrigues to Damascus. The ingratitude of the Khaliphs greatly diminished the ardour of the soldiers, but their fanaticism and courage were revived by Al-samah and Abd-er-rahman, names still preserved in many a popular legend of Languedoc.

The Arabian historian Makkarí describes the success of this invasion in a few graphic words.

God had struck terror into the hearts of the infidels; if any of them presented themselves to us, it was to ask for mercy. The Mussulmans seized the country, granted safeguards, conquered, plundered until they reached the valley of the Rhone, where, breaking their army into divisions, they spread themselves over the face of the land.

The same author gives a singular explanation of the apparent apathy with which Charles Martel, whom he calls Karlé, regarded the sufferings of the southern Franks.

Several Franks complained to Karlé of the excess of the ills occasioned by the Mussulmans, dwelling on the shame that would stain their national character, if they allowed light-armed men, destitute of military apparel, to brave cuirassed warriors, armed with the most terrible weapons that war had invented. Karlé replied, "Let them alone; they are now in the full tide of their ferocity; they are like a torrent, which overthrows everything in its passage; their enthusiasm is their cuirass, and ferocious courage their armour; but when their hands shall be filled with plunder, when they shall acquire a taste for luxury, when ambition shall seize their chiefs, and dissension appear in their ranks, then will we march against them, and obtain an easy conquest."

There are no details in the Oriental writers respecting the great battle in which Martel achieved the deliverance of Christendom, but they call the field on which it was fought "the pavement of martyrs," on account of the vast number of Mussulmans slain in the engagement. The distracted state of France prevented Martel from improving his victory, and Saracenic castles, called *Rebath*, were erected on the principal hills of Languedoc, and even on the banks of the Rhone. The Saracens were also introduced into Provence, by the turbulent Duke of Marseilles, whose ambition was too great to bear the supremacy of Martel. The revolutions in the Khaliphate, and the disputes between the Arabs and Berbers in the invading armies, however, soon weakened their strength, and France was easily delivered from the Mussulmans by Pepin, the son of Martel.

The second period of the Saracenic invasions commences with the reign of Charlemagne. That monarch was generally victorious over the Mussulmans; and, though he met a sad reverse at Roncesvalles, he not only preserved France, but established his authority over the eastern provinces of Spain. The scene was sadly changed under his feeble successors, especially when Abd-er-rahman II. ascended the throne of Cordova. This prince ravaged Languedoc and Provence, sending home songs of triumph to his favourite mistress, instead of dispatches to his minister. Makkarí has preserved one of these singular bulletins.

In the reign of Charles the Bald, France was pillaged by the Normans on one side, and the Saracens on the other; but the latter, contented with plunder, made no effort to form a permanent settlement, and this circumstance forms the peculiar characteristic of the second period of the invasions.

The third epoch commences with the establishment of some Saracenic pirates on the coast of Provence, whose rapid successes soon attracted hordes of other adventurers. This took place about the beginning of the tenth century, nearly at the time when the Normans besieged Paris. For nearly a hundred years, Provence, Dauphiné, Languedoc, Switzerland, and Northern Italy, were mercilessly ravaged by those barbarians, whom no treaties could bind, and no laws restrain: but, when the Normans were quieted by the cession of Neustria, and the Hungarians driven from Switzerland, the power of the Saracens gradually declined, and their chief settlement, Fraxinet, was taken by Count William, of Provence, A.D. 975. The decline of the kingdom of Cordova, after the death of Almanzor (A.D. 1002), was so rapid, that there was no longer any reason to dread an invasion from the Saracens of Spain, and those who were settled in France, being left without succour, perished in detail.

M. Reinaud examines at great length the condition in which the Christian captives were kept by their Saracenic masters, and shows that the horrors of their slavery have been greatly exaggerated. Those who became Mussulmans were instantly set free; many of them entered into the armies of the Moorish Khaliphs, and were highly valued for their bravery.

Even the slaves that remained faithful to the laws of Christianity did not lose all hopes of recovering their freedom. Princes and wealthy merchants among the Mohammedans, whenever any prosperous event occurred to them, believed that there was no better way of showing their gratitude to God than by liberating a number of their slaves. When the celebrated Almanzor heard that the troops of Cordova had gained a brilliant victory in Africa (A.D. 997), he set free eighteen hundred Christian captives of both sexes, as an act of thanksgiving.

Funds also were raised in most Christian countries for the redemption of captives.

Confraternities, which existed down to the Revolution, were formed to purchase the freedom of Christian slaves. It was justly deemed the consummation of pious heroism to quit friends and families —to devote life and all its energies to the liberation of one's captive brethren, at the imminent peril of sharing their lot. History has preserved the memory of one such devoted philanthropist, Isarn, Abbot of St. Victor, at Marseilles, who went into Spain, A.D. 1047, to redeem some Christians that had been carried off by pirates from the coast of Provence. Isarn was at the time weakened by a wasting disease, and his monks strenuously dissuaded him from undertaking such a perilous adventure. Disregarding their remonstrances, he accomplished his toilsome journey, and, after encountering formidable dangers, reached the place where the captives were detained. When the Christians were redeemed, they returned homewards by sea, but were, unfortunately, captured by another horde of pirates. Isarn commenced a new series of solicitations, journeys, and dangers; he succeeded in purchasing the second deliverance of the captives, but scarcely had he brought them with him to Marseilles, when he sunk under the fatigues and vexations he had endured.

We have very little information respecting the condition of Mussulman slaves in Christian countries, but the custom of having such slaves lasted longer than is generally believed.

Arnold, Archbishop of Narbonne, bequeathed the Saracen slaves on his estates to the Bishop of Béziers, A.D. 1149. About the year 1250, Roméo de Villeneuve ordered by his will, that his Saracen slaves, of both sexes, should be sold. Two hundred years afterwards we read of three Moorish slaves being purchased by King René....There exists a very furious letter, addressed by Pope Clement IV. to the King of Navarre, A.D. 1266, in which the Pontiff thunders against an Abbot of the monastery of St. Benedict, of Miranda, who had put a rich Saracenic convert to the torture, under pretence of his conversion being insincere, and had seized on all his estates, to the prejudice of his children.

The Saracens seem in general to have governed their Christian subjects with equity and moderation, differing in this, as in many other particulars, from their successors the Turks, with whom they have frequently been confounded. Their general form of administration may be best illustrated by the ordinance issued for regulating the government of Coimbra.

The Christians of Coimbra shall be governed by a Count of their own nation, who shall rule them according to their ancient laws and customs. All suits, criminal and civil, shall be decided by the said Count, but he shall not have power to pronounce sentence of death, without the concurrence of the Mussulman magistrate. He shall be obliged to bring the culprit before the said magistrate, and to read the text of the Christian law determining the penalty affixed to the crime, when, if the magistrate be satisfied, the culprit shall be put to death. Disputes between a Christian and a Mussulman must always be decided by Moslem law.

It only remains for us to inquire whether the Arabian literature produced any considerable effect on the civilization of the south of Europe. There is no doubt that, at the third period we have specified, the Saracens of Sicily, Spain, and even Africa, far surpassed the Christians of France and the neighbouring countries in all the arts and sciences. When Sancho, Prince of Leon, was dangerously ill, he sought and obtained a safe conduct from Abd-er-rahman III., that he might go to consult the Saracenic physicians at Cordova;—and the reviver of mathematical learning in Europe, the monk Gerbert (afterwards Pope Sylvester II.), derived his knowledge of the sciences from the Moorish universities in Spain. But bands of plunderers and pirates were not likely to become public instructors; and if, as some suppose, the early Troubadours derived the use of rhyme and the models of their amatory and military songs from Arabic originals, they obtained a knowledge of them by friendly intercourse, not by hostile invasions.

Finally, it seems evident that the direct influence of the Saracens has been greatly exaggerated. Even their outrages, frightful as they were, become slight when compared to those of the Normans and Hungarians....The true cause of the importance ascribed to the Saracenic name, is the influence which the romances of chivalry exercised in the Middle Ages, an influence which has not even yet wholly disappeared.

We may add, that not only writers of romance, but grave historians, gave the name of Saracen to every person and thing that was not Christian; hence arose the strange blunder of describing the Mohammedans as idolators, because, as M. Reinaud has shown, the pagan Berbers of northern Africa served in the Saracenic armies; and hence arises the error, which we have had, more than once, occasion to correct in modern histories, of calling the opponents of the crusaders Saracens, instead of Turks.

We have been induced to notice this work, not only by its intrinsic merits, but for its value as an example of the results that may be obtained from the study of original documents.

Memorials of Mrs. Hemans, with Illustrations of her Literary Character, from her Private Correspondence.

[Second Notice.]

We shall now proceed to give Mrs. Hemans's account of her visit to Wordsworth:—

"Rydal Mount, Monday, June 22nd, 1830.

"You are very kind in writing to me so soon, —, and making the remembrance of my journey with you one of unmingled pleasure, by your assurance that all was well on your return. For myself, I can truly say that my enjoyment of your society and kindness, and the lovely scenery by which we were surrounded, made those pleasant days seem as a little isle of sunshine in my life, to which I know that memory will again and again return. I felt very forlorn after you were gone from Ambleside: —— came and went without exciting a smile, and my nervous fear at the idea of presenting myself alone to Mr. Wordsworth, grew upon me so rapidly, that it was more than seven before I took courage to leave the inn. I had indeed little cause for such trepidation. I was driven to a lovely cottage-like building, almost hidden by a profusion of roses and ivy; and a most benignant-looking old man greeted me in the porch: this was Mr. Wordsworth himself; and when I tell you that, having rather a large party of visitors in the house, he led me to a room apart from them, and brought in his family by degrees, I am sure that little trait will give you an idea of considerate kindness which you will both like and appreciate. In half an hour I felt myself as much at ease with him as I had been with Sir Walter Scott in half a day. I laughed to find myself saying, on the occasion of some little domestic occurrence, 'Mr. Wordsworth, how *could* you be so giddy?' He has, undeniably, a lurking love of mischief, and would not, I think, be half so safely intrusted with the tied-up bag of winds as Mr. —— insisted that Dr. Channing might be. There is an almost patriarchal simplicity, an absence of all pretension, about him, which I know you would like; all is free, unstudied—'the river winding at its own sweet will,' —in his manner and conversation there is more of impulse about them than I had expected, but in other

respects I see much that I should have looked for in the poet of meditative life: frequently his head droops, his eyes half close, and he seems buried in quiet depths of thought. I have passed a delightful morning to-day in walking with him about his own richly-shaded grounds, and hearing him speak of the old English writers, particularly Spenser, whom he loves, as he himself expresses it, for his 'earnestness, and devotedness.' * * I must not forget to tell you that he not only admired our exploit in crossing the Ulverston sands as a deed of 'derring do,' but as a decided proof of taste; the Lake scenery, he says, is never seen to such advantage as after the passing of what he calls its majestic barrier."

The following is a very pleasant and characteristic letter:—

"Dove Nest, near Ambleside, July 6th, 1830.

"I think I was never so glad to hear from you, as when Claude and Henry brought me your kind and welcome letter on Saturday. I had been thinking of you so frequently since my arrival here, and so earnestly wishing to tell you all my feelings on taking possession of this lovely little bower, that I almost seemed, by the strong power of mind, to have brought you near; and it really was like hearing the pleasant voice of a dear friend to receive your letter just *then*. How *shall* I tell you of all the loveliness by which I am surrounded, of all the soothing and holy influence it seems shedding down into my inmost heart; I have sometimes feared within the last two years, that the effect of suffering and adulation, and feelings too highly wrought, and too severely tried, would have been to dry up within me the fountains of such pure and simple enjoyment; but *now* I know that

Nature never did betray
The heart that loved her.—

I can think of nothing but what is pure, and true, and kind, and my eyes are filled with grateful tears even whilst I am writing all this to you—to *you*, because I know you will understand me. I want nothing here but the spirit of a friend to answer the feelings of my own—*that* is indeed a want which throws some shade of sadness over this beautiful world, but I feel it far more bitterly amidst the world of society, where I find so many things to shrink from. Yet I think I never desired to talk to you so much and so often, as since I came here. I must try to describe my little nest, since I cannot call spirits from the 'vasty lake' to bring you hither through the air. The house was originally meant for a small villa, though it has long since passed into the hands of farmers, and there is in consequence an air of neglect about the little domain, which does not at all approach desolation, and yet gives it something of touching interest. You see everywhere traces of love and care beginning to be effaced: rose-trees spreading into wildness; laurels darkening the windows, with two luxuriant branches; and I cannot help saying to myself—'perhaps some heart like my own in its feelings and sufferings has here sought refuge and found repose.'—The ground is laid out in rather an antiquated style, which, now that nature is beginning to reclaim it from art, I do not at all dislike: there is a little grassy terrace immediately under the window, descending to a small court with a circular grass plot, on which grows one tall white rose tree; you cannot imagine how I delight in that fair, solitary, neglected-looking tree. I am writing to you from an old-fashioned alcove in the little garden, round which the sweet-briar and moss rose-tree have completely run wild, and I look down from it upon lovely Winandermere, which seems at this moment even like another sky, so truly is every summer cloud and tint of azure pictured in its transparent mirror. It is quite a place in which to hear Mr. Wordsworth read poetry. Have I ever told you how much his reading and recitation have delighted me? His voice has something quite *breeze-like* in the soft gradation of its swells and falls. How I wish you could have heard it a few evenings since! We had just returned from riding through the deep valley of Grasmere, and were talking of different natural sounds, which in the stillness of the evening had struck my imagination. 'Perhaps,' I said, 'there may be still deeper and richer music pervading all nature than any which we are permitted to hear.' He answered by reciting those glorious lines of Milton's—

Millions of spiritual creatures walk the earth,
Unseen, both when we wake and when we sleep, &c.

And his tones of solemn earnestness, sinking, almost *dying* away into a *murmur* of veneration, as if the passage were breathed forth from the heart, I shall never forget; 'the forest leaves seemed stirred with prayer,' while those high thoughts were uttered. I have been writing to you in a most child-like and confiding spirit, shall I not have tired you out with my details?—no, I will not think so. * *

"My boys are so happy here, I wish you could see them. Henry out with his fishing-rod, and Charles sketching, and Claude climbing the hill above the Nest. I cannot follow, for I have not strength yet, but I think in feeling I am more a child than any of them."

Here is another pleasant letter. We think the blank might in this instance have been judiciously filled up:—

"Since I last wrote to you, I have received a visit from a remarkable person, with whom I should like to make you acquainted. . . . His mind is full, even to overflowing, of intelligence and original thought. It is ——, the distinguished linguist, of whom I shall speak: besides his calling upon me, I also passed an evening in his society, and he talked to me the whole time. I do not know when I have heard such a flow of varying conversation—odd—original—brilliant—animating;—*any* and *every* one of these epithets might be applied to it; it is like having a *flood of mind* poured out upon you, and that, too, evidently from the strong necessity of setting the current free, not from any design to shine or overpower. I think I was most interested in his description of Spain, a country where he has lived much, and to which he is strongly attached; he spoke of the songs which seem to *fill* the airs of the south, from the constant improvisation of the people at their work; he described as a remarkable feature of the scenery the little rills and water-courses which were led through the fields and gardens, and even over every low wall, by the Moors of Andalusia, and which yet remain, making the whole country vocal with pleasant sounds of waters; he told me also several striking anecdotes of a bandit chief in Murcia, a sort of Spanish Rob Roy, who has carried on his predatory warfare there for many years, and is so adored by the peasantry, for whose sake he plunders the rich, that it is impossible for the government ever to seize upon him. Some expressions of the old Biscayan language, the *Basque* he called it, which he translated for me, I thought beautifully poetical. The sun is called, in that language, 'that which pours the day,' and the moon, 'the light of the dead.' Well, from Spain he travelled, or rather *shot off*, like Robin Good-fellow, who could

put a girdle round about the earth
In forty minutes,

away to Iceland, and told me of his having seen there a MS. recording the visit of an Icelandic prince to the court of our old Saxon king, Athelstan—then to Paris—(not the Iceland prince, but ——)—Brussels—Warsaw—with a sort of '*Open Sesame*,' for the panorama of each court and kingdom."

There is a great deal of truth in the following criticism, which has much wider application than to mere portrait painting. We beg leave to submit it to the consideration of the cognoscenti who never saw anything, ancient or modern, so fine as Mr. Wyatt's rampant charger:—

"I was much interested a few days ago in looking over some beautiful engravings of antique English portraits. I wonder whether you were ever impressed by what struck me much during an examination of them, the superior character of *repose* by which they are distinguished from the portraits of the present day. I found this, to a certain degree, the predominant trait in every one of them; not anything like *nonchalance* or apathy, but a certain high-minded self-possession, something like what I think the 'Opium Eater' calls 'the brooding of the majestic intellect over all.' I scarcely ever see a trace of this quiet, yet *stately* sweetness in the expression of modern portraits; they all look so eager, so restless, so trying to be *éveillé*."

Having heretofore given a few sketches of Scotland, we will add one or two of the sister kingdom:—

"Kilkenny is a singular-looking old place, full of ruins, or rather fragments of ruins; bits of old towers and abbey-windows; and its wild *lazzaroni*-looking population, must, I should think, be tremendous when in a state of excitement. Many things in the state of this country, even during its temporary quiet, are very painful to English feeling. It is scarcely possible to conceive bitterness and hatred existing in the human heart, when one sees nature smiling so brightly and so peacefully all round; and yet those dark feelings *do* exist here to a degree which I could scarcely have believed possible. * *

"I have discovered a very striking scene in this neighbourhood since I last wrote to you—a wild and deserted Catholic churchyard; but I believe I must describe it when I write next, that I may not be too late for this day's post.

"I will now describe to you the scene I mentioned in my last letter as having so much impressed me. It was a little green hill, rising darkly and abruptly against a very sunny background of sloping corn-fields and woods. It appeared smooth till near the summit, but was there crested—almost *castellated* indeed—by what I took for thickly-set, pointed rocks, but, on a near approach, discovered to be old tombstones, forming quite a little 'city of the silent.' I left our car to explore it, and discovered some ruins of a very affecting character:—a small church, laid open to the sky, forsaken and moss-grown; its font lying overturned on the green sod; some of the rude ornaments themselves but ruins. One of these, which had fallen amongst thick heath and wild-flowers, was simply a wooden cross with a female name upon it, and the inscription, 'May her soul rest in peace!' You will not wonder at the feeling which prompted me to stoop and raise it up again. My memory will often revert to that lonely spot, sacred to the hope of immortality, and touched by the deep quiet of the evening skies. * *

"I witnessed some days since a very remarkable, I might say *portentous*, scene—the procession of O'Connell through the city after his victory. He was attended by not less, it is computed, than a hundred thousand followers. There is something fearfully grand in the gathering of such a multitude. A harper, with harp of the old national form, and many insignia of ancient Ireland, preceded his triumphal car, and the tri-color (much at variance with all these antique associations) was displayed in every form around him. But nothing struck me more in the whole strange procession than the countenance of the demagogue himself: it was stern, sullen, full of *suppressed storm*, instead of anything like triumphal expression; it is said, that he feared an attempt at assassination that very day; certainly the character of his countenance was dark and inscrutable. * *

"Certainly, before this last and severest attack, I had gone through enough of annoyance and even personal fatigue, to try a far more robust frame; imagine three removals, and these *Irish* removals, for me, between October and January! Each was unavoidable, but I am now, I trust, settled with people of more civilized habits, and think myself likely to remain here quietly. * *

"You cannot conceive the difficulty of procuring respectable, and at all private, lodgings in Dublin; everything is for show and fashion, *nothing* for domestic feeling and delicate health. I could not help making an observation to an Irish friend this morning, which was admitted to be *most* characteristic of this country, that *domestic* tastes and habits *here* require as much apology as dissipated ones in England."

We shall now conclude with a few extracts from the closing chapter:—

"The desired improvement in her health not having taken place, it was thought prudent to remove her to Dublin early in March, in order that she might be nearer to her physicians. By this time, she had almost entirely lost the use of her limbs, and though not wholly confined to bed, was scarcely equal even to the exertion of reading. She was therefore entirely thrown upon the resources of her own mind; 'but never,' says her companion during these days, 'did I perceive it overshadowed by gloom. The manner in which she endured pain—and this, during the earlier stages of her illness, was very severe—surprised even me. She never murmured or expressed the slightest impatience at its long continuance. I remember her saying to me once, in a moment of

unusual anguish, 'that she hoped *I* should never be subject to what she was then enduring,' but this was the utmost of her complaints.' During these severest periods of her disorder, she was sometimes delirious —and it was remarkable to observe, from the incoherent words she uttered, how entirely the Beautiful still retained its predominance over her mind. * *

"When haunted by the promptings of too quick a conscience, which suggested to her, that her life and talents had not been rendered useful to their fullest extent, she would console herself with that beautiful line of Milton's,

Those also serve, who only stand and wait.

* * *

"It now remains for me to add a few more notices of the last solemn hours of life; for these I am indebted to her youngest son. 'After all the more painful part of her illness had subsided, she sank into a calm and gradual state of decline: I may safely say, that I never in my life, saw her so happy and serene as then. Her love of books became stronger than ever.' It has been already told, in her own words, that her love of flowers remained equally strong till death. 'She would have a little table placed by her bed-side, covered with volumes, one of which would lie open before her, even when she was unable to read—and she liked to be read to—for though frequently she could not comprehend what she heard, the sound of words seemed to lull her to placid slumber. The latest volume of Wordsworth's poems, which was brought to her about this time, excited in her the strongest interest; and she returned, after an absence and forgetfulness of many years, to the old pleasure, which, when very young, she had taken in the writings of Bowles; the quiet beauty of whose poetry seemed very congenial to her present state of mind. Almost the last book which she turned over with any appearance of interest, was Gilpin's 'Forest Scenery.'

"Within a short period of her decease, the dropsical symptoms abated; they were succeeded by hectic fever and delirium, the sure precursors of dissolution. On the twenty-sixth day of April she closed her poetical career, by dictating the 'Sabbath Sonnet,' which will be read and remembered as long as her name is loved and cherished. From this time she sank away gently but steadily,—still able to derive pleasure from being occasionally read to, and on Tuesday, the twelfth of May, still able to read for herself a portion of the sixteenth chapter of St. John, her favourite among the Evangelists. Nearly the last words she was heard to utter were, on Saturday the sixteenth of May, to ask her youngest son, then sitting by her bed-side, what he was reading. When he told her the name of the book, she said, 'Well, do you like it?' After this she fell into a gentle sleep, which continued almost unbroken, till evening, when, between the hours of eight and nine, her spirit passed away without a sigh or a struggle."

Narratives of South America: illustrating Manners, Customs, and Scenery, &c. By Charles Empson. This flaunting book (for its subjects are as strange to us, and its writer's language as high-coloured, as the figures and bright hues which adorn an India screen,) contains the letter-press description of "twelve coloured fac-similes of drawings, from sketches made at the various localities." It reads more like the harangue of a showman, who adds marvel to marvel, and grand epithet to grand epithet, till he knows not where to stop, than the carefully digested remarks of an intelligent traveller. The work, in short, is ridiculous from the profusion of its wonders:—as a specimen, we may mention the story of a mother, whose child having been bitten in two by an alligator, *baited her hook with the moiety she has rescued* from its jaws, in the hope of catching the monster to wreak her vengeance upon it! Chance willed that our *sortes Empsonianæ* should fall upon this revolting anecdote; which our readers will readily believe somewhat spoiled our appetite for the rest of the contents of the volume.

List of New Books.—Selections from the Phrenological Journal, 12mo. 5*s*. 6*d*. bds.—Surenne's New French Manual, 5th edit. enlarged, 12mo. 4*s*. hlf-bd.—The Flower and Fruit Garden, by Martin Doyle, 12mo. 2*s*. swd.—White's (Rev. Hugh) Meditations and Addresses on Prayer, 3rd edit. 12mo. 5*s*. bds.—The Promising God, a Performing God, by the Rev. R. Erskine, 3rd edit. 32mo. 1*s*. cl.—The Protestant Preacher, Vol. I. 8vo. 6*s*. cl.—A Layman's Account of Faith and Practice, 18mo. 2*s*. cl.—The Book of Shells, 18mo. 1*s*. 6*d*. cl.—Newland's Select Orations of Cicero, fc. 2*s*. 6*d*. cl.—Tarver's Introduction to the French Language, 12mo. 3*s*. bd.—Extracts from the Religious Works of Bishop Newton, 12mo. 6*s*. cl.—Christ our Example, 5th edit. 12mo. 6*s*. cl.—Crawford's Manual against Infidelity, 32mo. 1*s*. 6*d*. cl.; 2*s*. 6*d*. silk; Ditto, Practical Catechism, 32mo. 2*s*. cl.; 3*s*. silk; Ditto, Zion's Traveller, 32mo. 1*s*. 6*d*. cl.; 2*s*. 6*d*. silk.—The Tailors, a Tragedy, 18mo. 1*s*. swd.—Prideaux's Rules for Acquiring the Genders of the French Nouns, 18mo. 1*s*. swd.—Jukes on Indigestion, 5th edit. 5*s*. bds.—Hoffman's Legal Study, 3 vols. royal 8vo. 1*l*. 12*s*. bds.; Hoffman's Legal Outlines, 2 vols. royal 8vo. 21*s*. bds.—Taylor's Hymns for Infant Minds, 18mo. 28th edit. 1*s*. 6*d*. hlf-bd.—Clunie's Path of Life Faithfully Exhibited, 2nd edit. 1*s*. 6*d*. cl.—Gardner's Short-Hand Writer's Guide, 32mo. 1*s*. 6*d*. swd.; 2*s*. cl.; 3*s*. roan.—Cooper's Excursions in Switzerland, 2 vols. post 8vo. 2nd edit. 21*s*. bds.—Adventures of Jonathan Jefferson Whitlaw, by Mrs. Trollope, 2nd edit. 3 vols. post 8vo. 31*s*. 6*d*. bds.—Mason on Self-Knowledge, 32mo. 1*s*. 6*d*. cl.; 2*s*. silk.—Falconer's Shipwreck, 32mo. 1*s*. 6*d*. cl.; 2*s*. silk.—Jones (Rev. J.) on the Revelation of St. John, 12mo. 1*s*. swd.—Going to Service, 18mo. 2*s*. 6*d*. hlf-bd.—Graham's First Steps to writing Latin, 12mo. 2*s*. 6*d*. bd.—Young's Differential Calculus, 2nd edit. 12mo. 9*s*.; 8vo. 12*s*. cl.—Taplin's Walkingame's Tutor's Assistant, by Nicholls, 12mo. 2*s*. 6*d*. bd.—Hansard's Debates, 3rd series, Vol. XXXII. (2nd of Session 1836,) royal 8vo. 30*s*. bds.; 33*s*. 6*d*. hlf-bd.—Abbott's Way to do Good, 32mo. 1*s*. cl.—Glances at Life in the City and Suburbs, by C. Webb, post 8vo. 10*s*. 6*d*. bds.—Burn's Christian Sketch Book, 2nd series, 2nd edit. 12mo. 4*s*. 6*d*. cl.—The Great Teacher, by the Rev. John Harris, cr. 8vo. new edit. 7*s*. 6*d*. cl.—Schomberg's Commutation Tithe Act, with Epitome of the Law of Tithes, 12mo. 3*s*. 6*d*. bds.

METEOROLOGICAL JOURNAL FOR AUGUST.

KEPT BY THE ASSISTANT SECRETARY AT THE APARTMENTS OF

THE ROYAL SOCIETY, BY ORDER OF THE PRESIDENT AND COUNCIL.

1836. Aug.	9 o'clock, A.M. Barom.	9 o'clock, A.M. Attach. Therm.	3 o'clock, P.M. Barom.	3 o'clock, P.M. Attach. Therm.	Dew Point at 9 A.M. in degrees of Fahr.	External Thermometer. Fahrenheit. 9 A.M.	Fahrenheit. 3 P.M.	Self-registering. Lowest.	Highest.	Rain in inches. Read off at 9 A.M.	Direction of the Wind at 9 A.M.	REMARKS.
M 1	30.181	64.7	30.059	69.7	56	60.4	69.0	54.3	69.7		SSW	A.M. Overcast—light rain and wind. P.M. Fine—light clouds and wind. Evening, Cloudy.
T 2	30.080	70.0	30.097	68.9	51	68.9	67.6	51.6	69.0		SW	Fine—light clouds and wind. Evening, Fine and clear.
W 3	30.029	70.7	29.871	72.3	57	65.3	74.4	54.3	74.6		SE	Fine—light clouds and wind. Evening, Fine and clear.
T 4	29.859	69.3	29.899	72.4	60	66.3	68.8	57.0	72.2		SW	Lightly overcast—light wind. Evening, Cloudy.
F 5	30.000	66.7	30.016	71.3	60	61.6	66.8	58.7	70.5		N	A.M. Overcast—light wind. P.M. Overcast—light rain and wind. Evening, Fine and clear.
S 6	30.119	67.7	30.158	71.5	59	63.6	65.4	57.2	67.5		N	Overcast—light brisk wind. Evening, Fine and clear.
⊙ 7	30.245	68.2	30.204	70.2	57	59.2	67.5	51.9	68.9		N	A.M. Fine—light clouds and wind. P.M. Overcast.
M 8	30.202	70.2	30.186	71.0	57	62.0	70.0	54.5	70.5		N	Fine—light clouds and wind. Evening, Fine and clear.
T 9	30.241	67.0	30.188	68.9	58	60.8	66.4	54.9	69.2		N	A.M. Lightly overcast—light wind. P.M. Fine & cloudless—light wind.
W 10	30.204	66.4	30.166	69.0	57	59.6	69.5	50.9	69.0		N	Fine—light clouds, with light brisk wind. Evening, Cloudy.
T 11	30.307	64.4	30.303	68.9	54	62.0	69.0	53.7	68.9		NE	A.M. Cloudy—brisk wind. P.M. Fine—light clouds, with brisk wind. Evening, Cloudy.
● F 12	30.348	64.0	30.302	67.5	58	59.5	68.8	56.4	69.0		ENE	A.M. Overcast—light brisk wind. P.M. Fine—nearly cloudless.
S 13	30.225	69.2	30.122	69.9	62	65.4	72.0	54.5	72.0		NE	A.M. Fine—light clouds, with brisk wind. P.M. Fine—light clouds and wind.
⊙ 14	29.930	66.0	29.887	71.0	62	62.2	71.8	59.5	71.9	.272	N	A.M. Overcast—light rain—thunder and lightning, with heavy rain early. P.M. Cloudy—light wind.
M 15	29.960	67.0	29.988	71.2	62	62.5	71.8	59.0	72.5		WSW	Overcast—light wind.
T 16	30.194	65.0	30.158	69.0	59	62.7	68.7	54.5	71.6		NNE	A.M. Overcast—light wind. P.M. Cloudy.
W 17	30.111	69.5	30.113	72.9	63	66.4	73.2	57.2	73.4		WSW	Fine—light clouds and wind.
T 18	30.081	68.0	29.994	72.0	61	63.8	71.0	56.7	72.0		SW	Overcast—light wind.
F 19	30.196	69.0	30.188	69.8	52	59.2	66.5	54.5	67.0	.044	SSW var.	A.M. Cloudy—light brisk wind. P.M. Fine—light clouds & wind.
S 20	29.956	64.5	29.766	66.5	58	59.0	62.0	52.4	62.4		SSW	Overcast throughout the day.
⊙ 21	29.954	64.0	29.950	67.0	52	58.5	65.3	51.9	66.8	.075	NNE	A.M. Overcast. P.M. Fine—light clouds.
M 22	29.794	63.9	29.724	69.0	58	59.0	66.7	53.3	67.4	.013	SW var.	A.M. Overcast. P.M. Cloudy—light wind.
T 23	29.641	64.5	29.691	67.5	57	60.2	63.6	57.2	63.9	.027	N	Overcast throughout the day.
W 24	29.976	60.2	30.079	65.0	55	55.4	61.5	49.5	61.5	.125	NE	A.M. Overcast—brisk wind. P.M. Fine—light clouds and wind.
T 25	30.168	61.2	30.115	64.3	53	58.2	64.4	48.4	65.3		E	Overcast throughout the day.
○ F 26	29.984	61.5	29.976	64.5	58	59.0	65.2	55.6	65.5		SW	Overcast—light rain and wind.
S 27	29.936	66.0	29.913	67.6	57	62.0	69.5	52.7	70.2	.088	WSW	Fine—light clouds and wind.
⊙ 28	29.964	62.9	29.968	66.8	59	59.2	65.0	56.4	65.7	.161	E	A.M. Overcast—light rain. P.M. Cloudy.
M 29	30.148	64.9	30.130	67.8	54	58.5	67.0	51.0	67.7	.188	WNW	A.M. Fine—light clouds and wind. P.M. Cloudy. Evening, Fine and clear.
T 30	30.212	64.8	30.176	68.9	55	61.0	68.0	52.5	68.0		SSW	P.M. Overcast—light wind. P.M. Cloudy.
W 31	30.113	69.0	30.035	68.9	60	63.5	69.8	56.0	70.9		SSW	Fine—light clouds and wind. Evening, Fine and clear.
MEANS ..	30.076	66.1	30.046	69.1	57.5	61.5	67.9	54.5	68.9	Sum. .993	Mean of Barometer, corrected for Capillarity and reduced to 32° Fahr.	9 A.M. 29.978 — 3 P.M. 29.939

*** Height of Cistern of Barometer above a bench-mark on Waterloo Bridge=83 feet 2½ in.—Ditto, above the presumed mean level of the Sea=93 feet.—External Thermom. is 2 ft. higher than Barom. Cistern.—Height of Receiver of Rain Gauge above the Court of Somerset House=70 feet.

*** The observations for this month were not taken by the Assistant Secretary on account of absence.

SIXTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[*From our own Correspondents.*]

FRIDAY, AUG. 26.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Professor Sir W. Hamilton took the chair, and called upon the President, the Rev. Mr. Whewell, for an account of his new anemometer.

Mr. Whewell stated, that he had presented the instrument in an unfinished state to the British Association held at Dublin; since then, he had completed it and tried it, and found it to answer the purposes for which he had designed it so exceedingly well, that he trusted others would agree in the opinion he entertained when he determined to submit it, in its finished form, to the Section. It was an extremely portable instrument, standing very little more than two feet high. A neat little windmill, with brass vanes, was kept constantly presented to the wind by an arm, furnished with a flat disk, which projected on the other side. This little mill, by moving clock wheels, placed upon the top frame of the machine, gave motion to an upright brass screw, which caused a nut to move vertically downwards as the wind moved the machine; this nut carried a pencil, which was pressed by a slight spring against the surface of a cylinder, whose axis was that on which the head of the machine turned, and the pencil traced an irregular curved line on that surface as it descended. This cylinder was stationary, and its surface was divided by a number of vertical lines, representing the points of the compass: of these lines, four, corresponding to the cardinal points, were somewhat darker than the rest. The four which again bisected the arcs between these, were a little heavier than the others, and upon a circle at one spot the marks for the points of the compass were attached to these. The surface of cylinder was varnished or japanned white, in such a manner that the pencil marks were made clearly on it, but were readily removed with a damp cloth, when they had been recorded. It is obvious that the instrument could both record the force and the direction of the wind, and in this respect was superior to ordinary anemometers, for the length of time that the current of the aerial current has been moving in one direction, will appear from the length of line which the pencil has traced downwards without changing to a new point of the compass; and thus the total amount of that current which passes the place of observation in each direction will be obtained. The assemblage of the records of these facts for any length of time will exhibit a type of the course and quantity of the wind for such time. The mean of such records, at the same place, for different years, will exhibit the annual type; and the comparison of these annual types for different places, will, it is hoped, throw light upon the general annual movement of the atmosphere. In order to facilitate the recording of these indications, Mr. Whewell exhibited a system of marks which he had devised, which were easily remembered and used.

At the conclusion of Mr. Whewell's address, Professor Stevelly inquired whether Mr. Whewell contemplated the addition of clock-work to the cylinder, by the motion of which vertically a register for the several hours of the day might, he thought, be devised. Mr. Whewell answered, that it was not his intention to introduce the complication of clock-work into any part of the machine.—An animated conversation then took place between Professor Forbes, Sir W. Hamilton, Mr. Scoresby, Professor Lloyd, and Mr. Bull, in the course of which Professor Lloyd alluded to an instrument devised for similar purposes by a gentleman whose name we did not hear. And Mr. Scoresby strongly urged the getting rid altogether of the points of the compass in nautical and meteorological pursuits, and introducing in their place degrees, minutes, and seconds.

Mr. Whewell, having resumed the chair, called upon Professor Stevelly for his communication respecting the 'Mathematical Rules for constructing Compensating Pendulums.'

The Professor stated, that he had been accidentally led to attend to the importance of this subject. His friend, Dr. Templeton, of the Royal Artillery, had been kind enough to undertake to find a meridian line in the apartments of the Belfast Natural History Society, and had set up a clock of the ordinary eight-day construction, with a pendulum, which, although furnished with a deal rod, was not made with the design of compensating for changes of temperature—it had, however, a very large lenticular bob. This pendulum had gone in a room under a leaden roof, during the winter, when the temperature had been as low sometimes as 18° Fahrenheit, and during the summer, when it was frequently near 80°, and yet it had not varied more than a few seconds from mean time, and this not with any considerable departure from a mean rate of gaining. The surprise that this caused led him to perceive that a common pendulum, in which the under part of a large lenticular bob rested upon a nut, was in itself, to a certain extent, a compensating pendulum; and proceeding to apply the differential calculus to the determination of the change of place of the centre of oscillation, for a change of temperature, he found, that as the distance from the centre of suspension to the centre of gravity varied, since this distance entered into the formula for the length of the pendulum, it caused by its variation a great change in the position of the centre of oscillation of the bob; and further, that the position of that centre was affected by the change of the linear aperture, and of the thickness of the lens, the double of which gave the bob. This at once led him to perceive, that the rule given for the construction of compensating pendulums by Captain Kater, in Lardner's Cyclopædia, was erroneous, and necessarily led to over-compensation, as Captain Kater himself complains they do in one instance; but so faulty were the theoretic views themselves, that it would have been impossible by them even to discover the amount of over-compensation, or the manner of correcting it. Professor Stevelly then proceeded to exemplify the true formulæ and the rules to be thence inferred for construction, in the case of a deal rod and leaden tube compensating pendulum; and showed, that by Captain Kater's mode of deducing the compensation, a leaden tube, much shorter than what was truly the compensating one, would appear to be necessary. Mr. Stevelly also stated, that as the placing of the nut for regulating the pendulum at the bottom of the deal rod both led to considerable difficulty, and imperfection in constructing the pendulum, and required the pendulum to be stopped whenever its rate had to be changed, he preferred turning the bottom of the pendulum rod into a wide bracket, for the support of the metallic tube, and making the adjustment at the top; and he exhibited to the Section a brass suspension for the pendulum, which was to be firmly attached to the clock case; a micrometer screw movement, working the nut of this, would ensure the nicest alteration of the length of the pendulum, in order to attain a required change of rate. Mr. Stevelly had thought that the entire of this method was new, but his friend, Mr. Bradshaw, had informed him, that the French clocks were sometimes adjusted by a lever at the top of the pendulum; and the learned and respected Mr. Baily had informed him, that he had seen a nut placed at the top of a pendulum for adjusting its rate. The micrometer addition to it he believed to be new; however, when the fixed bracket is used below, this or some such mode of adjustment above must be resorted to. The using the bracket below had another advantage; by giving a proper shape to it the wooden part of the pendulum might be made to perform its oscillations accurately in a second, or in the same time as the heavy part of the pendulum, which was the only part attended to in ordinary rules for constructing pendulums. Professor Stevelly added, that these rules would also teach the manner of making a pendulum which should go as irregularly as possible, as the temperature to which it was subjected altered. This, he had been led by a friend, Surgeon Grimshaw, of Dublin, to perceive, would enable a person to form a self-registering thermometer, by connecting a clock, whose rate of going was regulated by this pendulum, whose rate varied with the temperature, with one which went truly to mean time; a slight addition of clock-work would then keep a hand constantly pointing to the temperature to which the pendulum was subjected, since the variations of that temperature would be a simple function of the difference of time shown by the two clocks. This method, he was under the impression, was first proposed by Sir David Brewster, but he had not succeeded in finding it among the multitude of his valuable writings.

Sir David Brewster stated that he had fully described such an instrument in the article, Atmospheric Clock, in the Edinburgh Encyclopædia.

Professor Phillips then made a communication 'On the Direction of the Isoclinal Magnetic Lines in Yorkshire,' (that is, lines of equal magnetic dip).

Professor Phillips stated, that the investigation, of which he was now about to give the results, was undertaken with reference to the results of observations by Mr. Fox, and with a view of determining how far the position of the isoclinal lines was affected by the geographical and geological configuration of the face of the country. The direction of the principal ranges of hills in Yorkshire, composed of stratified rocks, is so related to the line of the magnetic meridian, as to give an excellent opportunity of trying, on a limited scale, the dependence of the position of the isoclinal lines upon that configuration. The method adopted by Professor Phillips consisted in making a series of observations of dip and intensity at several points of the circumference of two circles, having a radius of twenty and of forty miles respectively from York as a centre. These researches were, as yet, incomplete, but, as far as the observations yet made upon so delicate a subject could be trusted to, it appeared, that the lines of equal dip were not straight, but had considerable flexures, distinctly related to the elevation of the ground, the bendings taking place rapidly to the south, on two elevated ridges, by which Yorkshire is intersected.

This communication called forth many observations from several members of the Section. Mr. Scoresby and Dr. Ritchie had doubts whether the differences of dip announced by Professor Phillips were not smaller than could be determined by the methods and instruments at present in use in these researches. Professor Lloyd expressed his conviction, founded upon his own experience, that the amount of the differences of dip obtained by Professor Phillips were considerably beyond the probable errors of observation, made carefully, with good instruments. Mr. Lloyd then proceeded to state the result of a series of observations which he had recently made in England, with a view of examining the remarkable conclusions announced by Mr. Fox. The observations made by Professor Lloyd with this view were made at various stations, extending from the North of Wales to the Isle of Wight. Their general result was, that the mean directions of the isoclinal lines in England differed very materially from the mean directions of similar lines in Ireland. In England the mean directions of these lines (as deduced from the observations by the method of least squares,) makes an angle of about 68° degrees with the meridian; while in Ireland, the corresponding angle has been found to be about 57°, being a difference of between 10° and 11°. Professor Lloyd then stated, that the directions of lines such as these, which depend on differences of dip, can be more safely depended upon, as it is much easier to observe these differences than the dips themselves. Hence the displacement of them could not be so decided as Mr. Fox thinks. It remained, however, to determine whether the change of inclination which he had stated would be sufficient to represent all the results of observation, or whether it would be necessary to admit also a change of absolute position of the corresponding lines; and he expressed his hope that he should be able to obtain a sufficient number of additional observations in other parts of England to throw light on this delicate and important question. He concluded by reading a portion of a letter from Captain Sabine, in which that gentleman stated the progress which he had made in observing the phenomena of terrestrial magnetism in Scotland, in the course of which he had noticed some remarkable anomalies in the dip, apparently arising from the nature of the rocks.—Sir David Brewster hoped that gentlemen engaged in these investigations would not lose sight of the possibility that the seat of terrestrial magnetism may be the atmosphere, and not the earth. He trusted, that by the next meeting of the British Association he should have it in his power to bring forward some very strong facts and arguments in favour of this opinion. Dalton had long since supposed it possible that the upper regions of the atmosphere were occupied by

ferruginous and other metallic particles in an extreme state of comminution, and had even thought that perhaps the aurora borealis originated from such source.

A communication from Sir D. Brewster, 'On a very simple contrivance for tracing lines in the solar spectrum, which were invisible by other means,' was then read by Mr. Snow Harris. Sir D. Brewster stated, that by a very simple contrivance he was enabled to render distinct the dark lines of the spectrum, to identify them with those of the nitrous gas spectrum under the most unfavourable circumstances; and to obtain other useful effects. This contrivance consisted simply in introducing a cylindrical refractor between the eye and the eye-glass of the telescope. The effect of this refractor was, as he showed, to give a linear form to a most irregular image, and thus he succeeded in detecting lines which the irregularity of the image concealed from view under other circumstances. As an illustration of the efficacy of this method, he stated, that in the dark line D of Frauenhofer, which is well known to be a double line in the yellow of the spectrum, he, by his method, observed an intermediate line nearly bisecting the space between the two lines commonly observed. This line is thus rendered still more interesting to the optician, as by it, aided by the cylindric refractor of Sir D. Brewster, he can verify the correctness of his apparatus, adjust it for observation, and obtain other useful results; and he expressed an opinion that the same method might be effectively applied to the observation of faint bands upon the body of the planets. The cylindrical refractor may be conveniently formed by inclosing oil of cassia in a cylindrical tube of glass.

Dr. Hare made a communication respecting 'Electrical Attractions and Repulsions, and upon the Electric Spark.'

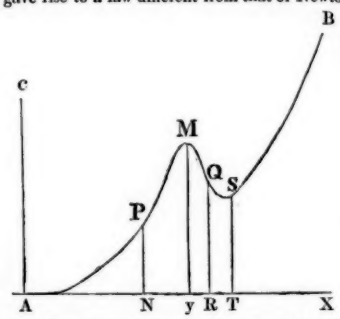
Dr. Hare expressed his opinion, that the most careful examination of electrical phenomena would lead to the conclusion that the supposition of two electric fluids was merely a dream of philosophers; that all the effects could be explained by supposing only what you were compelled to admit, that there was one electric fluid, and that a disturbance of the state of repose of this one fluid was the cause of electric excitation, the spark, and every other electric phenomenon; that there was no such thing as electrical repulsion, but that in every case where there appeared to be repulsion it was truly an instance of attraction exercised upon, suppose the gold leaves of an electrometer, by the surrounding bodies, principally the air. He then illustrated his views by a reference to diagrams representing single leaves with a brass ball placed alternately on each side, in which the ball attracted the gold leaf now to one side then to the other; next two gold leaves, with a ball on each side of each, which he contended, by attracting each a leaf, gave them the appearance of repelling each other; the very same office, he contended, was performed by the air in the ordinary experiment. He then explained an experiment in which, if a large ball at the end of a conductor was presented to a small ball at the end of an electrified conductor, the spark would pass in a zig-zag course, but if the size of the balls be reversed, the course of the electric spark would be straight and broad. This (he said) would be explained by the supporters of the theory requiring two fluids, by saying that one was the spark given by the positive fluid, the other by the negative; but he contended that there was but one fluid.

Dr. Ritchie maintained that there was no evidence that the divergence of the gold leaves arose from the attraction of the bodies at a distance, for if so, it must either be the air or the glass, and he asked Dr. Hare which? Dr. Hare replied, the air. Then, said Dr. Ritchie, we shall confine ourselves exclusively to consider the effect of the air; and it was obvious, from many circumstances, that this was not what caused the divergence, but from none more plainly, than that if you remove the air the repulsion remains. Many questions were here asked by Dr. Ritchie, and answers given by Dr. Hare. As to the experiment of the spark, Dr. Ritchie thought it must arise from some accidental difference of oxidation of the surfaces of the two sets of balls that were presented to each other.—Professor Stevelly could not agree with Dr. Hare's explanation of the divergence of the gold leaf. If there be but one fluid, and no repulsion, as Dr. Hare maintained, then, upon electrifying the gold leaves, the air between them ought to be electrified by induction more powerfully than the air beyond them, and therefore they ought to be drawn closer towards one another than in the contrary way. As to the experiment of the shock, he did not admit Dr. Ritchie's explanation of it by the different oxidation of the surfaces of the balls. Nor did he agree with Dr. Hare in thinking that any person supporting the theory of two fluids would give the explanation Dr. Hare supposed they would. The fact is, it is generally believed that atmospheric air exercises a very different confining or retarding power upon one than upon the other of them. He could confirm what Dr. Hare said of the flashes of electric light in the vacuum of the barometer tube. He had once, when filling a barometer tube with hot mercury, found every part of it in a highly electrical state, giving out vivid sparks, and the light flashing vividly through the torricellia vacuum at its top. It was very natural for Dr. Hare, as an American, to endeavour to maintain the theory of his great countryman Franklin, that there was but one fluid. But it was equally natural for him (Professor S.) to maintain the opinion first promulgated by an Irishman, Major Eeles, that there were two fluids. He begged to inform Dr. Hare that Mr. Faraday had lately proved that the amount of those electricities employed in chemical compositions and decompositions, was as definite as the combining proportions of the chemical substances themselves. Dr. Hare said he was fully aware of this, and had it all down in his notes.—Mr. Snow Harris said, that the fact need not be disguised, that there was no satisfactory theory. In his opinion it was quite incorrect, and indeed a perfect solecism, to speak of a vacuum as a conductor. The truth was, that in a vacuum the electric fluid moved more uninterruptedly along the surfaces of bodies which were not before good conductors. He explained in this way the experiment of the exhausted flask, usually called the Aurora Borealis experiment, and mentioned some modifications of it, and, in conclusion, gave a very clear illustration of the law of the confining power of the air at various distances.—Dr. Ritchie objected to Mr. Harris's explanation of the experiment in vacuo, and denied the accuracy of the description of his fundamental experiment.—Mr. Harris explained, and asked Dr. Ritchie how, upon his principles, he could at all explain the divergence of gold leaves in vacuo.—Dr. Ritchie maintained that his views were not wrong, and appealed to the last editions of Dr. Turner's work.

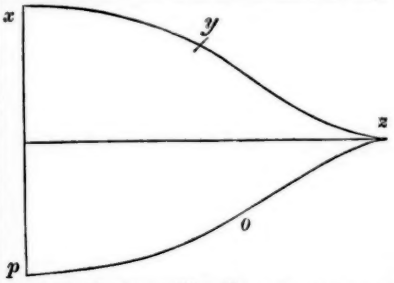
The President then summed up the arguments advanced in this conversation.

Dr. Carpenter then explained the method employed by Mr. Lucas in teaching the blind to read. He stated that the French had originated this art. He then described what had been done in Scotland; the invention of the Angular Characters, and the printing of the Gospel of St. John in it. He, in conclusion, exhibited the characters used by Mr. Lucas, which, being conversant with shorthand writing, was suggested to him by that character. He assured the meeting that nothing could exceed the facility with which the blind pupils learned and read this character. He apologized for intruding into this section a subject belonging to another, but which other was now unfortunately closed. Exhibited alphabet and numbers.—Professor Stevelly, who knew the angular character, thought this more simple, but feared that persons not blind would be unwilling to communicate with the blind in it.—The President interposing, said he could not allow any discussion on this paper; in truth, he took some blame to himself for allowing it to be read at all, and nothing but the respect he entertained for Dr. Carpenter, as one of the gentlemen to whom was owing the excellence of the arrangements for the reception of the British Association, would have induced him to do so. He then called upon Mr. Russell for his communication on 'Some of the Elements of the Resistances of Fluids,' which appear to be more intimately connected with the application of analysis.

Mr. Russell stated that he must allude to a paper which he had read in another Section, upon the relation between the resistances of fluids and the velocity of waves. The laws of these resistances reduced themselves to three heads:—1st. The law of the emersion of the floating body from the fluid, which is related to the velocity alone; 2nd. The relation of the resistance to the wave; 3rd. The relation of resistance to a certain form of the body. He found the emersion for every rate up to that of twenty miles per hour. He had since found that M. Du Buat had come to a conclusion which had some analogy to the first of these laws in respect to the pressure of fluids moving through solids—as pipes. As to the resistance due to the velocity of the wave, this gave rise to a law different from that of Newton.



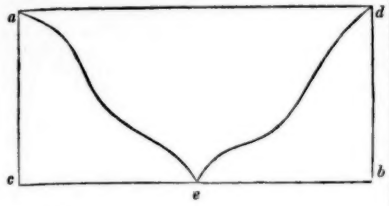
If the velocities be taken on a line A X, the corresponding resistances will, according to Newton's law, be the ordinates of a parabola A M. Mr. Russell found this to be true only up to the velocity of the wave. At the point of the curve M, corresponding to this velocity, it ceases to be a parabola,—has a point of contrary flexion, approaches the axis, has first a maximum ordinate at M, and then a minimum ordinate at S, and then passes into the infinite branch S B. As to the true solid of least resistance, the surge raised before the moving body caused it to vary from the Newtonian solid of least resistance; its shape



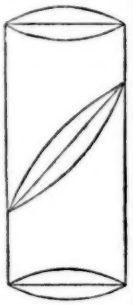
was in the front something like x, y, z, o, p,—x, y, and y, z, being two parabolic arches turned contrary ways, and of which he gave the measurements; the part of the solid behind x, p, was of the precise shape of Newton's solid of least resistance.—Professor Stevelly could not help remarking the close resemblance of those gigs and light boats which were intended to move very fast in smooth water, to the shape assigned by Mr. Russell, and of which form boat-builders must doubtless have arrived at a knowledge of the practical superiority. Vessels intended to live in rough seas, of course, required to be more bluff in the bows. —Dr. Ritchie asked Mr. Russell whether he derived this form from theory or from experiment.—Mr. Russell replied, from theory, corrected by many trials and experiments.

Mr. Hodgkinson then gave 'An account of his experiments, conducted at the desire of the Association, on the comparative Strength of Iron made with the Hot and with the Cold Blast.' These experiments had been conducted on iron from the Carron, the Buffrey, and the Devon Works. He had tried many experiments, of which he gave many of the details. In all cases the hot-blast iron seems to be somewhat, but not greatly, weaker, also its specific gravity somewhat less, except at the Devon Works; but he remarked that the fracture of the cold-blast iron was very white, while that of the hot-blast was grey. Some very curious facts occurred in the forcibly breaking some of the specimens. For instance, when a rectangular plate, having a rectangular rib down its centre, was broken with the rib

turned up, it readily broke; but when the rib was down, it required great force to break it, and this was never accomplished until the rib first threw out a wedged-shaped piece, which, in all the experiments, was of the same, or a similar shape; thus, suppose *a, b, c, d*, the rib, the wedge thrown out was of the shape *a, e, b*,



Again, when a cylinder was crushed by a force laid on its top, it always gave way by a plane of its particles slipping off sideways and downwards, so as to make the length to the breadth of the resulting oval as 14 : 10, giving an angle of inclination to the axis of about 54°. According to Young it ought to break by leaving a cone of matter below, and breaking off all round. He showed hundreds of specimens, in which the breakage gave the form stated; in one or two there was an approach to the conic form.



The President then declared the Section to be closed.

Section B.—CHEMISTRY AND MINERALOGY.

Before proceeding to the business of the Section it will be proper to state, that a verbal report was made in Committee by Mr. Hodgkinson, relative to the experiments in which he has been engaged at the request of the Association, upon the strength of different varieties of cast iron, whether prepared by the hot or the cold blast. We shall merely state, that he found Nos. 1 and 2 to have less tenacity when prepared by the hot than by the cold blast; but that the opposite was the case with the Devon iron, No. 3, which, when manufactured with the hot blast, was found less hard, but vastly stronger, than the products of the ancient or cold blast furnace. These experiments were considered highly interesting in a mechanical, chemical, and philosophical point of view, and Mr. Hodgkinson was requested to continue his researches on the subject.

Mr. Scanlan, a Dublin gentleman, who has devoted great attention to the destructive distillation of wood, brought before the attention of the Section two new compounds, the one a fluid, the other a solid, which he has succeeded in separating from the wood spirit or first 14 per cent. of the rectified pyroligneous acid. One of these, a peculiar and very remarkable fluid, he had, at a previous meeting, brought before the chemists of the British Association, when it was suggested that it might be the acetate of methylene of Dumas and Peligat, but, after further experiments, instituted for the purpose of bringing this point to the test, he declared his adherence to his original opinions, principally on the ground that, when treated with potash, it gives rise, not only to an acetate, but to a carbonate also of that base, and that when the supersaturated solution is distilled it does not afford pyroxilic spirit. The other compound, which is altogether new, is a solid, of a yellow colour, insoluble in water, but soluble in alchohol, separating from this fluid in long rectangular prisms. He detailed the properties of this substance, and that upon analysis it was found composed of carbon, hydrogen, and oxygen, in the ratio of 10, 5, and 2 atoms, a constitution so peculiar as to distinguish it from every other analogous body, and to leave no doubt of its being a perfectly new product. —Mr. Herapath conceived that he had encountered analogous products, but his observations on the subject were not satisfactory, and Mr. Scanlan showed that one of them at least was nothing but naphthaline. Mr. Scanlan wishes his new substance to be described under the name of *Eblanine*, and stated that its ultimate analysis was made by him in conjunction with Dr. Apjohn.

The next communication brought under the notice of the Section, by Mr. Cross, related to three distinct subjects: atmospheric electricity, improvements in the galvanic machine, and the application of electricity to the production of crystals found in the mineral kingdom, but which can either not be obtained at all, or with great difficulty, in the laboratory of the chemist. His experiments upon the electricity of the sky were performed on the grandest scale, and with effects proportionally striking and brilliant, in consequence of his conductor being a wire of prodigious length, and being insulated, and other wires arranged in a very skilful manner. The results, however, at which he arrived concur with those of other philosophers. For clear and steady weather the air is always positive, but in cloudy and foggy weather is perpetually varying from positive to negative, sometimes also appearing to be in the neutral state. These phenomena, which would appear easily deducible from the principle of induction, as applied to the action of a cloud at different distances from the conductor, the intervening stratum of air varying in the degree of its conducting power, Mr. Cross explains by supposing an electrified cloud as an aggregate of discontinuous masses of vapour, or that it is composed of a succession of zones not in contact, and maintained by the inductive influence they exercise upon each other in oppositely excited states. Such, also is, he finds, the case of fogs; and he stated that upon one occasion he distinctly found a mist which was drifted across his apparatus, to be composed of, as he expressed it, a succession of *marching columns* in opposite electrical states. Upon the effects which he produced by operating with the electricity of the atmosphere, it is not necessary to dwell. By its means he ignited combustible bodies, tore in pieces the most rigid materials, resolved chemical compounds into their elements, magnetized, and, in a word, reproduced, though upon a much more gigantic scale, all the known agencies of the artificial forms of the electric influence. Mr. Cross's observations upon the pile need not detain us long. The improvements he suggests, that the plates of the same couple should be brought as close as possible to each other, and immersed in glass jars, so that the different pairs should be, as much as possible, in a state of insulation, have been suggested by others—the former by Drs. Hare and Faraday, and the latter by Professor Hare, who employed cylindric glass vessels in his celebrated calorimeter. This latter contrivance, indeed, is very old, for it was employed by Volta in his Couronne des Tasses, one of the very first modifications of his extraordinary instrument, constructed by him. The views put forward by Mr. Cross, in reference to the origin of galvanic electricity, do not agree with those at present generally entertained. He abandons what is called the chemical theory, and reverts to the views originally propounded by Volta, namely, that the electricity is the result of the contact of the metals, and the acid merely acts as a conductor. We had nearly forgot, too, to mention, that Mr. Cross never found his electrometer affected by the Aurora Borealis, sheet lightning, halos, or other luminous atmospheric phenomena. The latter part of Mr. Cross's address was decidedly the most valuable, but, having been already detailed under the head of the proceedings at the Geological Section, it would be improper, because superfluous, to return to the subject. We will, however, observe, that the principle of his method is not at all new, the only difference between it and that of Becquerel being, as was pointed out by Dr. C. Henry, that the latter employed electricity of low tension, while Mr. Cross operated with powerful batteries. The results of both are, of course, different, as they directed attention to different substances; but, with the exception of silicæ, which Mr. Cross conceives that he has crystallized, they carry with them an equal degree of interest.

Mr. Law, conceiving it a favourable opportunity, exhibited some crystals of Iron Pyrites, artificially made, and described them as produced in immediate contact with the fine clay placed in the bottom of the iron pots employed in the manufacture of sal ammoniac. They adhered firmly to the clay, and exhibited the octahedral form.

Professor Barker, of the University of Dublin, then read a paper, intrusted to him by Mr. Davy, Professor to the Dublin Society, and which related to a compound of carbon and potassium, which he had formed while repeating Brunner's process for preparing the metallic basis of the vegetable alkali, and also to a new gas of the carburetted hydrogen genus, which is disengaged when this compound is brought into contact with water. Mr. Davy conceives the potassium compound to be binary, while the gas is represented by him as a bicarburet of hydrogen. Both these statements evidently cannot be true; and we have no hesitation in asserting, that his results, though very interesting, should be considered only as provisional, and requiring further confirmation.

Dr. Inglis then read a short, but interesting paper, tending to demonstrate, that iodine, in the solid form, is a non-conductor of electricity, but that by fusion it acquires conducting powers. He exhibited an experiment to establish this fact, and which consisted in passing through a tube filled with iodine, and having hermetically introduced through its extremities a pair of platinum wires, a galvanic current—the production of the current being proved by the decomposition of acidulated water, placed in a glass receiving the poles of the battery.

Dr. Cumming threw out the idea that the circuit might be completed by the heated air, which Mr. Faraday had proved to be a conductor; but Dr. Inglis showed, that in the present instance this was not the case, as when, after the melting of the iodine, the tube was so inclined that the extremity of one of the platinum wires rose over the fluid, the current was found suspended.—A further objection to his conclusion was urged by Dr. Apjohn, who suggested, that the iodine, at its melting point, acts on platinum, and that the conduction may be due to a minute quantity of the resulting compound.

Mr. Knox then explained the results of experiments in which he has been engaged for the purpose of insulating the supposed fluorine, a problem which has hitherto baffled the ablest chemists. Davy succeeded in separating it from certain metals, but its affinities are so energetic that he was not enabled to contemplate it in the free state, and concluded its existence from phenomena alone. Mr. Knox, by operating with very ingeniously contrived vessels of fluor spar, would appear to have succeeded in this object, and to have enjoyed the proud privilege of submitting to ocular examination a principle which has hitherto baffled the most eminent chemists. Mr. Knox describes it as a gas of a deep orange colour, and gives other satisfactory evidence that he had separated it, by dry chlorine, from the fluoride of mercury, the compound which was the subject of his experiments.

Mr. Black then made a very brief, but interesting communication, on a new method of estimating the strength of spirit. When spirit and water are mixed, heat, it is well known, is always evolved, and Mr. Black, finding that the rise of temperature upon the mixture of equal volumes bears a simple relation to the strength of the spirit, has suggested this rise as a means of estimating the actual amount of alcohol in spirit of any particular strength. This topic, viewed philosophically, is obviously related to that already brought before the Section by Dr. Thomson, and we must therefore refer to our account of his communication for these highly interesting scientific deductions, which are, no doubt, though probably in a modified form, equally true of mixtures of alcohol and sulphuric acid with water.

The business of the Section closed with the reading of a letter by Dr. Dalton, which he had received from Dr. Traill, and which related to an Aurora observed by him on the 11th of August. It did not give rise to any discussion, and we shall therefore, the subject being rather a hackneyed one, pass it over without further comment.

Upon the breaking up of the Section, Dr. Cumming, the President, congratulated the members present on the successful termination of their labours, and upon the number and the value of the original contributions which had been brought before them.

SECTION C.—GEOLOGY AND GEOGRAPHY.

The Marquis of Northampton laid upon the table some drawings of fossils submitted by Dr. Mantell.

Lord Nugent then made a communication respecting the sea rivulets in the bay of Argostoli, in the island of Cephalonia, referred to at the meeting last year by Mr. Babbage. These streams flowed from the sea into the land, and one of them had been employed to turn a mill. Many hypotheses had been started to account for such a phenomenon; some supposing a difference of level on different sides of the islands, and that the streams flowing through a subterranean tunnel restored the equilibrium; others supposed, that some volcanic relations were involved, although there does not exist any recent volcanic formation in the neighbourhood, and during an earthquake no effect was produced upon these rivulets.

Mr. Murchison referred to the chemico-geological theory, which accounts for volcanic phenomena, by the sea water being admitted to act upon certain inflammable bases in the interior of the globe; and he requested Dr. Daubeny to favour the Section with some of his views on that subject.

Dr. Daubeny said, that he had long been an advocate for the theory of volcanos originally proposed by Sir H. Davy, and considered the fact mentioned by Lord Nugent as confirmatory of it. It seemed, at least, to establish one of the conditions of the above theory, namely, that sea water really does find admission into the bowels of the earth; and although Cephalonia itself may not be volcanic, yet many of the neighbouring islands are, and in these, even where volcanic eruptions are absent, earthquakes are common, and subterranean noises, which may be regarded as the results of volcanic action, are heard. With respect to the opposite theory of volcanos, which had been maintained the other evening by Professor Sedgwick, Mr. Whewell, &c., he would say thus much, that, as he had never pretended to do more than to show, that the present phenomena of volcanos implied chemical action, he was quite ready to leave the mathematicians to settle it between them, whether the earth had been originally in a state of fluidity or not. He thought, however, that, as man had as yet scarcely done more than scratch the surface, it was rather rash to conclude, that, because, so far as we had yet gone, an increase of temperature had been observed, therefore the same law held good, even to the centre of the earth. Such an inference resembled what might have occurred in Lilliput, had the philosophers of that island, in their examination of the contents of Gulliver's pockets, chanced to have discovered an orange. This huge globular mass would have, doubtless, excited such curiosity, and would have first been rolled on to the Geographical Section of the great Lilliputian Association, whose members after circumambulating its circumference, and taking a map of the inequalities and depressions of its rind, would have referred it to the more particular examination of the geologists. The latter, not content with so superficial an examination, would, by dint of labour, succeed in piercing the rind; but in attempting to penetrate the white, would soon find themselves stopped by its tough and leathery texture, which would be denser and tougher the farther they descended into it. Unable, therefore, to get any farther, and utterly ignorant of the pulp in the middle, these philosophers would here have finished their labours, and, in the spirit of the advocates of the central heat theory, might have reasoned, if the density and toughness of the portion of the orange we have pierced through increases in the above ratio, what must the density and toughness of this same leathern substance be at the centre?

Mr. Greenough then addressed the assembly respecting the discoveries communicated by Mr. Cross on the day before. He said, that in their admiration of these discoveries, which were perfectly original, and made without knowledge of the labours of others, the Section must not forget that justice was also fairly due to certain foreign chemists, who had prosecuted a similar line of investigation. He read a passage from Dr. Buckland's Bridgewater Treatise, to show that M. Becquerel had also formed minerals by means of electricity; and he mentioned the names of Berthier, Rose, and others who had succeeded in the same path. Still, the highest praise must be awarded to Mr. Cross for his originality.

Mr. Charlesworth then rose, and stated, that there are reasonable doubts of the correctness of the views of Mr. Lyell, regarding the proportion of recent and extinct species in tertiary strata, and especially from the more accurate examination of the crag of Norfolk and Suffolk. On showing to M. Agassiz a vast number of fossil shells and fishes found in that formation, that accomplished naturalist was unable to detect any species resembling those now existing—there were even some remote genera. Dr. Beck, of Copenhagen, had also dissented from the conclusions of M. Deshayes on this subject; also other conchologists had given opinions on this point, all differing from that of Mr. Lyell, which made it first to be inquired, what was really the essential difference between species. This rendered the question extremely difficult. Mr. Charlesworth considered, that the amount of analogy of the age of tertiary strata should be determined by the totality of the forms, and then class as contemporaneous those containing the same per-centage of recent to fossil species. He had also distinguished a difference in the fossils of the upper and lower crag, those of the latter being of more remote genera than those of the former. There was another difficulty: often the sea washes fossil shells out of the crag, and these are found strewed on the beach; and this was not peculiar to Norfolk, as fossil shells had been found in other countries on the shores of rivers, from the banks of which they had been washed out. This would likely prove a source of considerable confusion, as these crag fossils are constantly washed into the sea, and mingled there with recent organic remains. Nay, when the crag rests upon chalk, it contains chalk fossils, that must in former ages have been washed out of the matrix, and mixed with the remains of animals then existing. A corresponding case had been described by Dr. Morton in America. Mr. Charlesworth concluded by expressing his belief, that Mr. Lyell's divisions must be greatly modified according to the progress of discovery.—Lord Northampton mentioned a similar case of the mixture of recent and fossil shells on the coast of Sicily.—Dr. Buckland complained of the little attention which had been paid to the Norfolk crag by British geologists; and in reply, Mr. Sedgwick stated, that Mr. Taylor had placed in his hands valuable drawings of that formation—that Mr. Wood had determined four hundred and fifty species of shells—and Mr. Woodward had collected, among the fossil mammalia, teeth of the mastodon. He also remarked, that, with respect to the determining the species of shell, it was often necessary to call in the aid of the anatomist, and when, as in fossil species, the fossil covering only remained for inspection, there might be often doubtful cases. He certainly differed widely from Mr. Lyell in some of his conclusions; but he praised the philosophic spirit of that gentleman, which had cast a new charm round geology, so as to multiply its votaries—and which had given us a starting point—a base line, from which to measure our progress—a visible horizon, to which we might refer our observations—the best possible horizon, being the actual state of things. Dr. Buckland said, that in his new work he had adopted Mr. Lyell's classification of tertiary strata, as being the best yet proposed, and even Mr. Lyell was aware that they must be modified by future discoveries.—Mr. Clark mentioned a mistake of Mr. Lyell's in regarding as contemporaneous the clay covering the crag—this clay containing a number of substances evidently combined with it by diluvial action. He had seen specimens of minerals in it, which had been derived from the mountains of Scotland, and he had observed it filling hollows of previous existence in the crag. He was always of opinion, also, that there was a difference in the ages of the upper and lower crag.—Mr. Greenough mentioned, that Von Hof had, a number of years since, adopted opinions similar to those of Mr. Lyell, in referring to the existing order of things for explanations of geological phenomena.

The last paper brought before the Section was by Professor Forbes. That gentleman had, during his travels in the Pyrennees, traced a remarkable connexion between the hot springs of that district with its geology. He had found that the granite of that country had acted upon the other rocks in such a manner as to show extreme cases of disturbance, and that, round the lines that marked the connexion of these rocks with granite, these springs were certain to be observed; also mineral veins were certain to abound in the same situations—so that four co-ordinate facts had been determined,—the presence of granite, its alteration of the adjacent rocks, the vicinity of veins, and the position near to them of mineral springs. A number of interesting facts regarding the temperature of these springs were mentioned; also an account of the examination of a spring, whose temperature had been accurately ascertained one hundred years ago, and last year by Professor Forbes, who found the thermometer stand at the same point as that recorded in the last century. He represented the springs of the Eastern Pyrennees as by far the most remarkable.—Mr. Sedgwick asked, could this granite be yet *cold?* It would prove the opinion, that the granite of the Pyrennees is very recent. He mentioned how often igneous rocks were found near hot springs, and it was plain that the cracks made by the protrusions of these rocks were so many moulds for the reception of mineral matter.—Mr. Clark instanced his observations on a well at Poole, Dorsetshire, the temperature of which never varied from 51¼° at any season or time. A letter from Dr. Traill was read, accompanying a collection of fossil fish from Orkney. The drawing of a fish found in the old red sandstone of Clashbinnie, Fifeshire, was also exhibited, together with a bone from Malta, sent by Dr. John Davy.—Mr. Charlesworth showed a drawing of a jaw of mososaurus found in Essex.

Thus closed the proceedings of the most interesting geological meeting that has, perhaps, ever taken place. The interest excited throughout the week cannot be conceived by those who were not present. The mass of interesting matter brought forward was quite unexpected.—Professor Sedgwick said, that the present meeting was worth all previous ones put together—that now the British Association was really advancing science, all the branches of which were becoming more and more connected with each other. The new views of physical science brought forward at the Geological Section were the most important advances yet made in Geology. This would gradually be numbered among those branches of knowledge under the dominion of mathematical laws, and be eventually placed in the same ranks with her kindred sister Astronomy.

SECTION E.—ANATOMY AND MEDICINE.

Mr. Adams, one of the surgeons of the Richmond Hospital, Dublin, gave an oral account of the morbid appearances he had noticed in different joints of the body, the results of a disease which, for want of a better name, is called chronic rheumatism. He stated that the profession were now quite familiar with this disease as it appeared in the hip joint, which is fortunate; for heretofore there can be no question but that both in the living and the dead the disease was confounded with morbid affections totally different, and requiring different treatment. The shortening of the whole limb, and eversion of the foot, made the affection, in its external characters, much resemble the fracture of the neck of the thigh bone, and when the actual bones are examined after death, the resemblance these bear to the fracture alluded to was, on a superficial examination, very striking, and accounted for these mistakes having been made over and over again. But the external signs of this disease are now well known, and the ivory deposit in the place of the cartilage removed, and the complete filling up of the bottom of the acetabulum or socket of the hip, by a hard osseous deposition, render the distinction easy to the pathologist. This distinction, even in a pathological point of view, is of more consequence than might at first sight appear; for the anatomical character of the head and neck of the thigh bone, in the morbus coxæsenilis, are so similar to the case in which it might have been imagined that an intra-capsular fracture of the cervix femoris had united, that the mistake has been frequently made, and erroneous inferences have been drawn, and false hopes encouraged, as to the practicability of effecting a reunion of the fractured neck of the thigh-bone. From viewing these cases, the result has been, that the mild, and he would say merciful mode of treating advised by Sir A. Cooper, of the intra-capsular fracture, (the subjects of which are generally old and debilitated,) has been abandoned, and splints and bandages applied, which have created irritative fever, and even death.

Mr. Adams then produced specimens of the same disease in the shoulder joint—showed how the gle-

noid cavity of the shoulder blade became enlarged, as well as the head of the humerus—and further pointed out that almost invariably the loss of the tendon of the biceps was to be noticed, analogous to the uniform loss of the internal ligament, when the hip was affected. The existence of foreign bodies on the joint was also stated as a common occurrence in these cases; the effusion of synovial fluid in increased quantity—the atrophy of the deltoid muscle—the adduction towards the middle line, by the pectoral muscle—and the apparent slipping in and out of the head of the humerus, gave the idea of what is called a partial luxation of the humerus. Mr. Adams took occasion here to explain what was the real case of partial luxation of the humerus; he referred to the case of dissection found at p. 305 of Sir A. Cooper's work on Dislocata, and brought forward to illustrate the pathology of partial luxation of the humerus, which, however, in his opinion, was not really a partial luxation, but this chronic disease of the shoulder joint, called chronic rheumatism, or "rheumatic gout." Mr. Adams took occasion to apologize for thus alluding to Sir A. Cooper's labours, who he was satisfied had done more to enlarge our knowledge of the accidents the joints are liable to, than any other individual living; but by many dissections and observations, Mr. Adams felt satisfied that the case of partial luxation of the humerus, as described by Sir A. Cooper and others, required to be verified further by dissections before the entire assent of the profession should be given to it; and he felt quite convinced that the case described by Mr. Patey in Sir A. Cooper's valuable work (page 305, new edition), and represented in an engraving, plate xxii, figure 2, is a true specimen, and an admirable illustration of the disease under consideration. Mr. Adams here showed several specimens of this disease of the shoulder.

Mr. Adams next exhibited examples of what he attributed to a similar morbid action which had taken place in the elbow joint; here also the size the bones had attained was considerable; there were numerous foreign bodies, from the size of a pea to that of a small walnut; some of them were cartilaginous, some bony—the articular cartilages had been removed from the ends of the bones, parallel grooves in the direction of flexion and extension were shown, and in these, and in their neighbourhood, an ivory deposit was shown. Two specimens, from two different subjects, one in the wet state, the other dry, were produced; another specimen showed the ivory enamel on the head of the radius; its increase of size was noticed, and a depression was formed to accommodate its rotation on the humerus; and, strange to relate, in two cases, a dimple-like depression was formed on the globular head of the radius, and a round ligament like that of the femur was produced. The same disease was also exhibited in the knee joint; similar enlargement, parallel grooves in the line of flexion, foreign bodies, vascularity of the synovial fimbriæ, were all noted as in the elbow joint, removal of cartilage, and substitution in its place of an ivory deposit. The hip joint appeared most frequently affected, the knee and elbow next, the shoulder and wrist next; in short, Mr. Adams has seen the same disease in every joint; the fingers also become distorted by it. It does not confine itself to the *heads of the bones*, but the same, or a similar morbid disposition to deposit a porcelain-like matter existed even in the *interior of the bones*, the substance of the radius, the interior of the head of the femur—the lower jaw itself. A drawing was here produced of this disease in a woman aged thirty, who was at this moment under treatment in the Richmond Surgical Hospital, whose hand and fingers were distorted, adducted, or drawn to the inner side of the fore-arm, in that characteristic manner which at once reminds us of the affection of the system of the joints, tendons, &c. called chronic rheumatism. The lower jaw in her case is so distorted, that the chin passed the middle line at least one inch to the left side.

The importance of distinguishing this painful, though not dangerous disease, from all others, was pointed out, as well as the danger of having recourse to blisters, setons, and incisions, all of which he had known proposed, and some *practised*. The *coexis cana* of numerous foreign bodies with this morbid condition of the bones of the joints, the cartilages, and the vascular condition of the synovial fimbriæ, were much dwelt upon; and the danger and folly of attempting the excision of foreign bodies when these form such a *small part* of the disease, was pointed out.

Although Mr. Adams felt assured that many of the observations he was now making to the Section of Medical Science, and proving by the actual exhibition of specimens, were new, he did not mean to assume merit to himself; but except he showed they were new, he could scarcely be excused for delaying the Section with them. As far as the hip joint is concerned, he must acknowledge that even so far back as the period when he commenced his professional studies, the external signs of this disease were well known in Dublin; and the anatomical character, as to the ivory deposit, and thickening of the capsular ligament, had been for many years alluded to in the clinical lectures delivered in Dublin, and were more clearly pointed out by his young friend, Mr. R. W. Smith, in his account of this disease in the 6th volume of the Dublin Medical Journal. However, a beautiful engraving of this disease will be found in the Museum Anatomica of Sandifort. Sir Benj. Brodie, in his work on the Joints; Mr. Key, in the 18th volume of the Medico-Chirurgical Transactions; Lobstein, in his Pathological Anatomy, tom. ii., have all very briefly alluded to this disease, as well as Benjamin Bell, &c.; but Mr. Adams has not seen anywhere so complete an account of this affection in all the bones as its importance would appear to him to demand. Cruveerlthier, of Paris, has certainly entered more fully than any other writer into its pathology and pathological anatomy, and has denominated this disease, *Usure des cartilages articulaires*, thus giving to the disease "a local habitation and a name." But the name would confine the disease to the cartilages and to the joints; but Mr. Adams had shown that the irritation, whatever it be, or whatever name you give to it, extends to all the structures around the joints, and the shafts and centres of the bones themselves. Mr. Adams wished that he could say something satisfactory as to the treatment of this disease, but he confessed that upon this head he had not much that was satisfactory to communicate.

Mr. Adams next brought forward a very fine preparation—both of the lower extremities of an individual, who had died of cancer, who sixteen years before had been admitted into the Richmond Hospital by the late Mr. Todd, on account of a popliteal aneurism in his left ham; the artery was tied in the thigh. In three weeks the man walked out of the hospital perfectly well, never having had a bad symptom, nor his pulse ever having risen above 80 in a minute. The case, so far, is published in the 3rd vol. of the Dublin Hosp. Reports. In three years subsequently to this, the poor fellow applied again to the same hospital, and the late Mr. Todd again performed a similar operation, which was followed by a similar happy result, and he never suffered any further inconvenience in his limbs, having been perfectly cured of his aneurisms. In April last, when Mr. Adams was prescribing for the Dispensary patients at the Richmond Hospital, this man, M'Owen, applied to him; it was too plain, from the emaciated appearance of this once athletic man,—from his peculiar or pale straw-coloured hue, and expression of countenance, that some bad organic internal disease had taken possession of him; and a few inquiries made it clear that a cancer of the stomach, near its œsophageal orifice, existed. He was advised to return to the country, as little or nothing could be done for him: but now being about the age of forty-two, and full of hope that his life might be prolonged, and of confidence in the hospital where he was twice before relieved, he returned, and demanded admission. Everything was done that could be thought of to palliate his sufferings, but in vain. Upon dissection of both limbs, which was done by his friend Mr. R. W. Smith, the learned curator of our Museum, and to whom is due the merit of this splendid preparation, it was found that the main artery of the limb on each side was interrupted only for half an inch in one inguinal region when tied, and for a quarter of an inch in the other; and in each popliteal only two inches converted into a ligamentory chord; the circuitous channels, which acted as supplementary canals to carry round the blood when obstructed in the main artery, were seen much enlarged, and were remarkably tortuous. The case differed from most others, in the circumstance of the canal of the main artery having been so much restored; the case showed in a strong light the great advancement which the science and the practice of surgery had made, and the debt (*humanly speaking*) which was due to the genius of John Hunter, who first pointed out the method of treating popliteal aneurism, by including the femoral artery in a ligature at a *distance* from the diseased artery. The old operation was so painful and so dangerous, that the late Mr. Percival Pott was known to have stated, that were he the subject of this disease, he should much prefer to submit to amputation of the thigh, than to undergo the pain and risk of the operation for popliteal aneurism practised in his day. In this case, by two simple incisions, which caused but little pain and no fever, he was twice perfectly cured of the most formidable disease which can afflict humanity.

Mr. Hetling, of Bristol, then read a paper, 'On a new Instrument for the removal of the Ligature of Arteries at pleasure.'

Mr. Gordon, also of Bristol, then exhibited some anatomical models, carved by himself, in ivory.

The last paper read, was 'On the Chemistry of the Digestive Organs,' by Robert D. Thomson, M.D. The author began by drawing attention to the necessity of admitting chemical action as an important agent in digestion, because, inasmuch as every change in the position of the ultimate particles of matter is a chemical or electrical change, so the conversion of food into chyme and its assimilation must fall under this head. Dr. Thomson divided the consideration of the subject into—I. Chemical state of the stomach, first, in health; and secondly, in disease. II. Chemical state of the mouth and œsophagus, first, in health; and secondly, in disease.—I. First, He remarked that our most eminent physiologists had completely overlooked the experiments of Dr. Prout and others, which establish the fact that in health the stomach contains a quantity of free muriatic acid. He referred to the recent experiments of Braconnot, who had found a great quantity of this acid in the stomach, and who had determined by very satisfactory experiments that no lactic acid was present. Dr. Thomson detailed an experiment, in which he had succeeded in converting muscular fibre into a substance exactly resembling chyme, by digesting it in dilute muriatic acid, on the sand bath, during ten hours, taking care to keep the mixture as nearly as possible at the temperature of the atmosphere. He, therefore, drew the conclusions:—first, that the stomach, in a state of health, when excited by stimulants, contains a quantity of free muriatic acid; and second, that dilute muriatic acid is capable of producing by digestion, at the temperature of the human body, a substance similar to chyme in its physical properties. From which it may be inferred that free muriatic acid is an important auxiliary in the process of digestion. Second, with reference to the state of the stomach in disease, Dr. Thomson observed that the most common form in which chemical re-agents were affected, was by a redundancy of acid, occasioned by the introduction into that viscus of acid fruits and vegetables, which gave rise to fermentation, and the symptoms of heartburn, a very familiar complaint. He next proceeded to describe the only other form of disease of the stomach, which was indicated peculiarly by the action of re-agents, by an alkaline state occurring in the disease commonly termed *pyrosis* or *water-brash*. Having investigated this disease very carefully with regard to its chemical nature, he showed that it proceeded from the diseased state of the secretion in the stomach,—alkali having taken the place of the free acid. By chemical analysis he found that the alkali was ammonia, and probably, also, a little soda was present. Having discovered this very remarkable and important fact, the practice consequent upon it was evident, and the result proved of the most satisfactory nature; he found that the administration of acid gave immediate relief. If the case was of a chronic nature, he prescribed anodynes,—as conium and hyoscyamus, in order to act directly upon the nerves, should they have been long subjected to the action of the diseased secretion. Dr. Thomson detailed the particulars of several cases. In one instance, a female had become so much emaciated, in consequence

of the disease having existed daily for three months,—the patient ejecting by the mouth, in the course of the day, not less than a pint of tasteless fluid. Dr. Thomson immediately prescribed for her aromatic sulphuric acid, and in the course of two days, when he next saw her, the disease had entirely disappeared; nor was she again affected by it. The author stated that he had been unable to detect any general laws, which would seem to regulate this complaint. He had met with it in all constitutions and ages, and equally as abundantly in England as in Scotland. Butter and all oleaginous substances were liable to produce it, as well as the simultaneous use of apples and porter, at least in some individuals.

II. First, Dr. Thomson next proceeded to detail the results of his experiments upon the chemical state of the fluids of the mouth during health, which, in confirmation of the experiments of Donné, of Paris, he had found to be alkaline, and sometimes neutral. He noticed the experiment of Donné, which would appear to prove that the mucus membrane of the alimentary canal (which is alkaline) and the skin (which it is well known is acid) constitute a kind of Voltaic pile; for when one of the poles of a delicate galvanometer is placed in contact with the mouth, and the other with the skin, very distinct electric currents are produced, which cause the needle to effect 15°, 20°, and sometimes 30°.

Second, the author stated that he had found the mouth indicating an acid re-action whenever inflammation existed in any of the membranes in connexion with it, as in laryngitis, pleuritis, bronchitis, gastritis, and enteritis, and in other diseases of an inflammatory nature. He directed the attention of medical men to this fact, as a most important feature in the diagnosis of such diseases. He stated that he had extended his observations to all inflammatory diseases, and had found, uniformly, that inflammation of mucous and serous membranes in all parts of the body, is attended by the secretion of free acid. Hence the scientific method of removing this source of irritation in such diseases, viz., by the local application of alkaline solutions, as in erysipelas, inflammation of the urethra, &c. He stated also that he had examined the chemical composition of the membrane deposited in croup, and had found its principal constituent to approach nearer the character of albumen than any other animal substance, which would add some weight to the opinion of Donné, that morbid products derive their origin from the free acid secreted on the surface of the membrane upon which the product is deposited.

Section G.—MECHANICAL SCIENCE.

Tuesday.

The first subject of discussion was a proposed improvement by Mr. Copham, of Bristol, of a mechanical contrivance by the celebrated discoverer of logarithms, for performing certain operations of arithmetic. It is known by the name of Napier's Rods. Mr. Copham's improvement consists (as far as we could understand it from the description given of it to the Section,) in cutting the rods up into cubes, perforated through the centres of two of their adjacent sides, through which perforations they were to be strung upon certain pins, of which there were two sets, numbered from zero to 9. We the less regret the possibility of conveying any intelligible notion to our readers of this invention from the account given of it to the Section, because we are sceptical of the practical advantages which it is possible to derive from any mechanical process of performing the operations of arithmetic.

The communication of Mr. Copham was followed by some very important observations of Mr. Robison, one of the Vice Presidents of the Section, on the supply of water to the paddle-wheels of steam-boats. This supply, he stated, did not come from the surface of the water, or from the sides of the space through which the wheel moves at each revolution in the water, but from beneath—a fact, which the theory of fluid pressure might have indicated, but which appears to have occurred first to Mr. Robison. It was proved as follows: a steam-vessel was moored in deep water, the surface of which was for a considerable distance round strewed (it being calm weather) with sawdust. The engine was then put in motion, and it was observed, that the sawdust all around and everywhere, except immediately behind the paddle-wheels, remained undisplaced.

A paper, by Mr. Henwood, of the Portsmouth dock-yard, was then read, on certain points in the theory of naval architecture. As far as we could learn, the object of this paper (which was read in a very low tone of voice by the President,) was to call the attention of naval architects to the importance of constructing ships on theoretical principles, embracing the consideration, not only of their tendency to oscillate transversely, or to bear a greater or less disturbing force in the direction of the beam, without upsetting, but with a view to their tendency to oscillate longitudinally, or round an axis in the direction of the beam of the vessel.

The stability of a vessel may be considered to have reference to its oscillating round a transverse or a longitudinal axis, or to its oscillations round axes intermediate between these. On its stability transversely, or round its longitudinal axis, depends its power of carrying sail in gales of wind, without falling on its beam ends; whilst, on its stability longitudinally, or in reference to its transverse axis, depends its greater or less oscillatory motion in heavy swelling seas and storms in the direction of its length, called by the sailors a pitching motion, which, if it exceeds the limits of the vessel's stability in the direction of her length, fills her, and she founders.

The question of the stability of vessels, in reference to disturbing forces on the beam, had, it was stated, been first† discussed and solved by Atwood, and vessels are always built with a view to this stability, but never with a view to the other, their longitudinal stability. The stability of a vessel in either direction, Mr. Henwood stated (as we understood it,) to depend upon its moment of inertia; moreover, that an uniform loading of its hull, and, as far as possible, an uniform distribution and perfect symmetry of its parts fore and aft, as well as on its beam, were necessary to the uniformity of its oscillations towards the head and stern, and from side to side.

In respect to the beam of the vessel, this symmetry of construction and equipoise of loading was, he said, correctly observed; the two sides of a vessel were exactly alike, and it was loaded equally towards either side: not so, however, of its head and stern; they were not symmetrical, and the lading was seldom or ever stowed with a view to the equilibrium of the vessel in this direction, or rather with a view to certain conditions of the equality of its momenta of inertia, in respect to a transverse axis through the centre of the vessel. Thus, the oscillations of the vessel, produced by the same disturbing force, would be different, as it acted towards the bow or the stern of the vessel, and it would pitch more in one direction than in the other, to its manifest danger in a heavy sea.

Professor Moseley expressed his regret that the author of this paper was not present.‡ It appeared to him, that he had referred the oscillatory motion of the vessel exclusively to the moment of inertia of the vessel itself and its lading, and taken no account of the moment of inertia of the plane of flotation, and the position of the centre of gravity, on which elements the stability was well known entirely to depend, and the magnitude of the oscillation principally. The other cause, affecting the oscillation, the moment of inertia of the vessel and lading, might be so combined with this as to cause symmetrical oscillations, even although the vessel was not itself, either as to its form or lading, symmetrical.

Dr. Daubeny then gave an account of an instrument which he had constructed for taking up water from any required depth in the ocean, for the purpose of chemical analysis, being an improvement of a French instrument contrived for that purpose, and sent out in the *Bonite*. It has been discovered, that the constitution of the air with which rain water and river water are saturated, is not that of atmospheric air: its constituent elements are indeed those of the atmosphere, but they are mingled in different proportions: the atmosphere, everywhere and under all circumstances, is found to contain 21 per cent. of oxygen: the air, or rather gas, contained by rain and river water, appears by the experiments of MM. Humboldt and Gay-Lussac to contain from 29 to 32 per cent. of oxygen; and sea water, taken from the Mediterranean at a depth of 1000 metres, appears from an experiment of M. Biot to contain 28 per cent. Moreover, it appears, that near the surface the quantity of this air combined with rain and river water, is about one thirty-sixth of the volume. Now, a question arises—is it combined in the same proportion with the water at greater depths? and is its constitution the same? These are questions of great importance, because enormous quantities of air are thus, no doubt, combined with the fluid elements of the earth's surface; and this air must originally have modified, and may now, modify the condition of the atmosphere itself. It is only by taking up water from different depths of the ocean, preserving the air which it contains, that this question can be solved; and for this purpose Dr. Daubeny's instrument was contrived. It was a cylinder of glass, having at one end a valve opening inwards, and open at the other end. Within the cylinder was a solid heavy piston, fitting accurately to its interior surface, but moving freely in it. To either end of the instrument, when it was used, a string was to be attached, the opposite ends of this string being fastened, one at the bow and the other at the stern of the vessel. The instrument was to be let down into the water by that string, which was fastened to the open extremity. The heavy piston then being at the bottom of the cylinder, and the upper portion of it being open, and, of course, filled with water, would continue to be so filled until the instrument had sunk to a depth equal to the length of the other string, its further descent would then be arrested, and, by the action of the other string, its position would be inverted. In this inverted position the heavy piston would be at the top of the tube, and descending by its weight would expel the water beneath it, through the open extremity, whilst the space above it was filled through the valve. Time having been allowed for this process, the instrument was to be raised by the string which originally let it down, and it would manifestly return charged with water from a depth equal to that of the string which inverted it. We did not exactly perceive in what consisted the improvement of Dr. Daubeny on the instrument sent out in the *Bonite*.

† This we believe is a mistake.

‡ The paper was read by the President.

Wednesday.

A paper was read by Mr. Chatfield, a gentleman educated, we believe, at the Government Naval Architectural College at Portsmouth, 'On certain circumstances connected with the progress of Naval Architecture.' Mr. Chatfield stated, that from the entire neglect of all theoretical principles in naval construction, there was found and generally acknowleged towards the commencement of the present century a decided inferiority in the sailing and other sea qualities of our ships, as compared with those of other nations, and particularly of the French. In the year 1806 Commissioners were appointed to inquire into this fact, and to suggest some means of remedying it. Among various means suggested by them were periodical reports of the sailing qualities of ships of war to be made by their officers, and registered at the Admiralty; these reports had accumulated there in great numbers, but had, he believed, never been applied to any useful purpose. They were, indeed, observations of so general and indefinite a character, that they were scarcely available as experimental data—the terms used in them were terms of the most uncertain comparison. A ship was said to stand well or ill under her sails, to roll quickly or slowly, to pitch greatly or but little. The comparison of ships of different constructions with one another, by means of such observations as these, was, he said, a matter of the utmost uncertainty, and, for any practical purpose, worse than useless. Another method of acquiring experimentally a knowledge of the relation between the sailing qualifications of ships and their build was trial. A number of ships, of different lines of construction, were formed into a fleet, and sent out on a cruise of two or three months, during which they would be subjected to the same varieties of weather, under all which a comparison might be drawn. This method he characterized as one which would furnish invaluable data to the ship-builder, if the ships sent out were such as differed only in respect to the particular points with regard to which the comparison was to be made. If, for instance, they were all of the same tonnage, and of the same build, except in one essential feature, the

effect of which it was required to ascertain, and if they were all rigged alike, and carried the same quantity of canvas, or if, in fact, the experiments partook in any degree of this character of precision. Such, however, was not the case: ships of every tonnage, of every variety of rigging and quantity of sail, were tried against one another, and conclusions were thence drawn as to certain peculiarities in their building—peculiarities which perhaps influenced their sailing much less than the other circumstances in which they differed. He suggested, that for the loose reports of the opinions of the officers of our ships of war on their sailing merits, should be substituted accurate registers of observations, made with proper instruments, which might register the precise angle of their oscillations, the corresponding force and direction of the wind, and the quantity and disposition of the canvas, &c. That these observations should be reduced, compared with the dimensions and build of the ship, and published; and that the mean of them, when their number had sufficiently accumulated, should form the basis of the authorized theory of our naval architecture.

Mr. Price next exhibited to the Section a model of Seaward's patent excentric Paddle-wheel, which he had, he said, introduced with great success in some steam vessels of his own, and which, it appeared, was generally used in the government Mediterranean steam-packets. It effected, he said, a saving of one-third in fuel and time. His vessel could do with it 108 miles in 8 hours. From the description given, it appeared to us, that the peculiarity of these paddle-wheels was this: that the float boards, instead of being made, as in the ordinary paddle-wheel, to enter the water with a flat surface opposed to it, or at any rate with a surface opposed to it obliquely, so as in entering to waste a portion of the power of the engine in pressing it uselessly downwards, and leaving the water to raise it uselessly upwards, might, by this contrivance, be made to enter the water vertically, and, when it had entered the required depth, to impel it horizontally, in which direction its re-action would be wholly effective in propelling the vessel, and then to leave the water as it entered it, by a vertical motion, or a motion in the direction of the plane of the float board itself. One fact was mentioned in reference to this paddle-wheel which appeared to us,—having a full and painful recollection of the vibratory motion which is usually given to steam-vessels by the action of the paddle-wheel,—to be of great interest and importance—it was this, that so steady was the motion of a vessel propelled by these wheels, that a letter might with ease be written on the very paddle-box itself.

Mr. Russell would state, that in Scotland they had had great experience in steam vessels, and he would state some circumstances which were within his knowledge, and he would address himself particularly to the incrustation on the boiler, produced by the salt water. He had found out, when on board a steam vessel, a simple and beautiful expedient for remedying this, and it had been kept a perfect secret. He would take a boiler of a cylindrical shape—that which was most dense in the water would of course fall to the bottom, and, therefore, as the cold water came in at the top, the salt would descend to the bottom below the furnace, and then came the secret: there was a pipe with a stop cock, and the engineer filled the boiler a little too full, he then opened the stop cock and got off the salt; the boiler was worked for nine months, and a man was then sent into it for the purpose of clearing it out, and he found he had nothing to do, for there was no incrustation; with regard to the engine, he was not one of those who expected any very great radical improvement in its construction. Watt, in his opinion, had left them but very little to do. In Scotland they had adopted the plan of the Cornish engine. An engine was worked on the high pressure system, and it worked expansively, and with this engine at the top of deep water, with a cargo of 150 passengers, in its ordinary rate, he had gone 14¾ miles an hour; the great thing to be attended to, was the precise place of fixing the engine; he believed that, with the ordinary boilers well made, and everything being of the best kind, every effect they could be reasonably expect would be obtained.—With regard to paddle-wheels, he considered those produced by Mr. Price of great value, where the engine was not properly fixed, or properly proportioned, or where the vessel was not a good one; but he was convinced, from a long train of circumstances, that in a well-built vessel, with properly proportioned engines, the common paddle-wheel was not only the simplest, the cheapest, the most secure, but was the best in theory as well as in practice. If the vessel remained continually at rest it was quite true that the best direction in which the float-boards of the wheel could enter the water would be the vertical direction, but when the boat was in motion this certainly would not be the case. The flat surface, which, on its entering the water, the float-board, then moving vertically, would present to the water, would manifestly retard the motion; and the force, which, by the common paddle-wheel was uselessly employed in beating down the water and raising the vessel, would here be employed to a yet less useful purpose in presenting the surface of the float-board directly to the resistance of water. It was stated that there was a contrivance by which this wheel might be suited to different depths of immersion of the vessel. It appears to us, that the great desideratum is to be able to vary the position at which the float-boards enter the water according to the speed of the vessel.

Mr. Price maintained, that the patent paddle-wheel was very far superior. He had laid out 1000*l.* in putting them to his vessel, and he had found that he could beat all the other vessels of the same size.

This discussion had occupied the Section till three o'clock.

Dr. Lardner said that he would postpone his observations on long trips by steam till the morning.

Thursday.

The meeting was this morning occupied by a communication from Mr. Enys, 'On the duty of Steam Engines in Cornwall,' in which were stated some facts connected with the recent history of these engines, which are of the highest interest and importance. There are instances in which the work done by an engine has, by means of certain precautions with regard to the radiation of heat from the boiler, and a method of working the steam, as it is termed, *expansively*, been doubled, with the same expense of coals.

It appears that when the engine of Mr. Watt was introduced in Cornwall, and that of Newcomen superseded, the patentee fixed, as the remuneration for the use of his patent, that he should receive one-third of the profit which his engine would yield over one of the old construction, estimated by the value of the coals which would be saved by it in producing a given effect. The effect was to be estimated by the quantity of cubic feet of water which a bushel of coals would raise one foot high in one hour, called the duty of the engine. With engines of the old construction this was fixed at about seven millions, and an instrument being contrived by Mr. Watt for registering this duty on his engines, it was found to amount, in 1793, to nineteen millions and a half; thus effecting a clear saving of considerably more than one half the coals required to produce the same effect; the profit thus accruing was immense: in one instance, that of the Chacewater mine in Cornwall, Mr. Watt's third of this profit was compounded for at the rent of 2400*l.* annually. In 1778 the duty of Mr. Watt's engines had fallen, from some cause unexplained, to seventeen millions and a half; and after the expiration of his patent less attention appears to have been paid to the duty of engines than before, when they were registered for the payment of the patentee, and the duty had fallen, in 1812, to thirteen millions and a half. It has now been raised on an average, in the Cornish engines, to seventy millions, being an economy of fuel amounting to between four-fifths and five-sixths of the whole consumption in 1812. The means by which this wonderful economy of fuel has been produced, have been, 1st. A more careful application of all the heat given off by the coals to the production of steam. 2ndly. A more effective application of the steam itself, when thus produced, to the working of the engine. The first object is attained partly by casing the boiler with wood, a space being left between it and the boiler, in which sawdust is rammed—the case, thus filled, is an admirable non-conductor of heat—a vessel in which, all the heat contained in the boiler is carefully preserved and employed in generating steam; so effectual indeed is this precaution, that in the engine house, which used to be unbearably hot, the men have been known to require a fire to keep themselves warm. Another method of applying the heat more entirely to the generation of steam, consists in an improved construction of the boiler, by which the heated air is brought in contact with a greater surface of water—or rather of metal, having on its other surface water; and last, but not least, by a more careful cleansing of the interior surface of the boiler from the hard deposit which forms upon it, and was formerly allowed to accumulate sometimes to the thickness of half an inch. These are the methods by which the heat yielded by the coals has been more effectually applied to the production of steam.

The second and great improvement consists however in the more effective application of the steam after its production to the working of the engine, by working it expansively. The meaning of the term "working expansively" is this: the valve through which the steam is admitted would, if there were no expansive power in the steam, manifestly require to be kept open during the whole time that the piston, which it drives before it, was traversing the cylinder, and the instant it was shut off, the piston would cease to move. Steam, however, is an elastic fluid, and the steam at any time admitted into the cylinder would, even if all communication with the reservoir from which it came were closed, still by its own expansive force tend to move the piston, and would actually move it if the resistance upon it were not in excess. Now the improvement of working expantively consists precisely in this expedient of shutting off the steam from its communication with the boiler before the course of the piston is completed, and leaving it to be impelled through the remainder by the expansive energy of the steam already admitted. Formerly the steam continued to be admitted until the course of the piston was completed; now it is shut off when the piston has traversed from one-sixth to one-half the whole length of the cylinder, and thence principally has resulted this enormous saving of fuel.

An engine of Mr. Austin's, at the Consolidated Mine, was, by these means, got up (as an experiment) to a duty of 120 millions, thus producing, with the same quantity of coals, nearly nine times the useful effect of the engines commonly in use in 1812. In carrying these various precautions for the economy of fuel into effect, the agents are, of course, the engine men, called stokers; and in inducing them to enter upon them with that good will which could alone bring about the results we have stated, the exciting cause has been the publication of Duty Papers, copied from registers made, we believe, daily, of the duty of each engine; these are taken with scrupulous accuracy, and with the most certain precautions against deception, and thus a comparison may continually be drawn between the working of different engines, involving the character of the engineers, and even regulating their wages, for a certain allowance is commonly made by the masters for all duty done beyond a certain limit. The engineer is thus induced carefully to examine every part of his engine to keep it in the best possible condition, to husband his coals most scrupulously, and to cherish the heat in his boiler by every conceivable expedient of sawdust, and flannel, and wood, and plaster. When the expedient of a sawdust coating was first introduced, it is said that all the sawdust to be obtained in the country was for the time exhausted.

Mr. Enys further mentioned an important improvement in the working of the engines used for stamping the ore in Cornwall. These were formerly double stroke engines, and the rapid motion of the piston was reduced to that required for stamping, by the intervention of a train of cog wheels. It was believed that the operation of stamping could not be carried on by a single stroke engine, of which class of course are all those used in Cornwall for raising water. Mr. Austin,* however, conceived that it would be possible, by the use of large fly-wheels, and heavy connecting rods, to throw enough of momentum into the machinery to carry it through the descending stroke, and effect all the purposes required of it for stamping, and moreover to obtain a great increase of duty by the substitution of a single for a double action engine. He constructed one at Wheal Kitty, from which he obtained the enormous

* We believe this to be the name of the engineer mentioned by Mr. Enys.

duty (for a stamping engine) of fifty-five millions, instead of a duty which ranged on the old construction from six and a half to twenty-three millions. A part of this effect is however to be attributed to his having dispensed with the train of wheels used before for reducing the velocity, and their friction, and to his having connected the stampers immediately with the crank (as we understood) of the engine. Mr. Enys concluded by proposing a new form of the Cornish duty paper, including the passive resistance or friction of the engine. The following are its principal elements:—

The Efficiency—Gross power, force, and space of steam cut off.

Power—Neat power (independent of friction) available for impelling machinery.

Effect—Gross work done, including friction.

Duty—Real work done.

We consider this communication of Mr. Enys to have been among the most interesting and important made to the meeting, and it was with great regret that we witnessed a manifestation of impatience among certain members of the Section to hear a discourse which they expected from Dr. Lardner, on steam communication with America. One gentleman, indeed, so far forgot himself, as to call upon the chairman to gratify him and his friends by silencing the speaker, who was then communicating to the Section facts more important, perhaps, than any others which had occupied its attention. This most unbecoming interruption was very properly checked by the chairman, and we sincerely hope that no similar attempt may, at future meetings of the Association, render it incumbent on the general Committee to introduce additional precautions in the issuing of tickets.

Dr. Lardner then addressed to the Section a discussion of the important question of steam navigation to distant parts, and especially to America: a question at the present moment of great interest everywhere, and especially at Bristol, where a company of merchants is now building a steam vessel of 1200 tons burden, to navigate directly between that port and New York.

He began by observing, that the very circumstance of the present and pressing interest which was felt upon the subject of steam communication with distant parts of the world—the fact that already considerable investment of capital had been made in such speculations—were circumstances which would somewhat embarrass them in arriving at a safe and certain conclusion, because t would be obvious that they would, more or less, engender in the minds of a considerable portion prejudices which would be liable to bias their judgment. He was aware that since the question had arisen in this city it had been stated that his own opinion was adverse to it; that impression was totally wrong: but he did feel, that great caution should be used in the selection of the means of carrying it into effect. He believed that those who knew him would readily acquit him of being forward to question the power of steam. But there were distinctions to be drawn, depending on the length of the trips and on the stages into which they were divided. There was one main distinction between the operation of a marine engine and a land engine. The marine engine was used with salt water, and the land engine with fresh water. Heat would convert that water into steam; but the heat which would do that with the water would not do that with other subjects which were combined with sea water; it would not do that with salt, which in consequence produced an incrustation in the boiler, and this was most injurious. A remedy for this had been discovered which was almost perfectly efficient, which was the use of copper boilers. There had been a contrivance brought into operation, which, if it was as effectual as its promoters considered it to be, would be a perfect remedy—he alluded to a condenser, which was known by the name of Hall's condenser, which was so contrived that the steam circulated like the blood in the human frame; but this had been discovered by Watt, who had left little for his successors to do.‡ With regard to the power of steam-engines, practical men considered that for short trips the best proportion was to give the vessel the power of one horse for every two tons: that as the length of the trips increased they must have a smaller proportion of power; there should be three tons for every horse power; and that for the longest trips to which steam power could at present be applied the proportion should be at most one horse to four tons. It might be asked why this particular proportion was selected? and the answer was this—that it was found by experience that such would not contain sufficient coals; but the surplus of power in long voyages would be invaluable where power was most valuable. It was necessary they should devise some means of determining the locomotive duty of coals. He had made extensive observations, and he considered you must place 15lb. of coal per hour for every horse. Mr. Watt some time since established a series of experiments on boilers, with the view of determining the relative consumption of fuel, and the result was this—that the consumption of fuel under the marine boilers was one-third less than under the land boilers. Dr. Lardner then recapitulated the evidence collected by a Committee of the House of Commons on the expediency and practicability of a long steam communication with India; he instanced, also, the line of steamers from Falmouth to Corfu, touching at Gibraltar, which, on an average of 51 voyages, made their trips at the rate of seven miles and a quarter per hour. Almost all the vessels with which the experiments had been made had the patent paddle-wheels, and they had been worked with the best coals. The next question was, what modification the vessel must undergo when applied to steam communication with the United States. In the Atlantic there were westerly winds which prevailed almost continually, and were extremely violent, and attended with a great swell of the sea; but it was an astronomical phenomenon which was very well understood. The outward voyage of the great packet ships was generally estimated at 40 days, the homeward voyage at 20 days, so that the entire voyage occupied 60 days. If, then, they assumed that the average of the outward and homeward voyage to the United States corresponded with the average weather between Falmouth and Corfu, then they would arrive at this conclusion, that the outward voyage was worse than the average in the proportion of 4 to 3. Taking his data from the voyage between Falmouth and Corfu, Dr. Lardner entered into some calculations with respect to the quantity of coal which would be required on the direct line from Bristol to New York. The result of these led him to conclude that it would be inexpedient to attempt a direct voyage. The question, then, he said, became a geographical one, as to the best mode of accomplishing the voyage. There were two ways which might be proposed; one to make the Azores an intermediate station, and to proceed from thence to New York; the other would be to proceed to some point in Newfoundland, and make that an intermediate station. The distance from Bristol to the Azores was 1,300 miles, and from the Azores to New York 2,400 miles. There was a point called Sydney, in Cape Breton, where there were coal-mines, worked to a profit by Messrs. Rundell & Bridge, but then that was 2,300 miles; but if we took our final departure from some place upon the western coast of Ireland, and there charged the vessel with coals, the distance to Sydney would be only 1,900 miles. He would therefore counsel those who proposed to invest capital in this most interesting enterprise to keep in mind certain points to which he would direct their attention. 1st. He would advise that the measured tonnage should correspond with the tonnage by displacement. 2nd. To go to an increased expense in using the best coals. 3d. He would earnestly impress upon them the expediency of adopting the paddle wheels shown in the Section yesterday. 4th. He advised the proportion of one to four on the proper tonnage. 5th. He would impress upon them the expediency of giving more attention to the selection of engineers and stokers; it was a matter of the last importance, as a saving of 30 to 40 per cent. might result. With respect to the boilers, he would recommend copper ones. Lastly, he would advise the coal-boxes to be tanked.

‡ A contrivance was afterwards mentioned by Russell, as adopted in Scotland, by which the water of the boiler was continually changed, and thus the deposition of the salt prevented; we are at a loss to see how this could be done, except at a great expense of fuel.

A supplementary meeting of the Mechanical Section of the Association was held on Saturday morning, at which Dr. Lardner resumed his reply to those who spoke on Thursday, on the subject of Steam Communication with the United States.

He stated, that it has been proved before the Committee of the House of Commons, that in fifty-one voyages made by the Admiralty steamers between Falmouth and Corfu, in the four years ending June 1834, the average speed, exclusive of stoppages, and without allowing for deviation in the course of the vessel, was 7¼ miles an hour; and that the vessels performing this had a greater proportion of power to tonnage than can be allowed in longer voyages, and were totally disencumbered of commerce; that the consumption of coals by marine boilers was usually from 10 to 11 lb. a ton; but that, by care, it was sometimes reduced to 9, and sometimes to 8 lb. per ton:—taking it at 9 lb. per ton, 1 ton of coals consumed for each horse power would transport a vessel in the seas between Falmouth and Corfu about 1,900 miles; but that he considered the weather to be encountered in the outward voyage to New York at least 25 per cent. worse than the average weather between London and Corfu, and therefore, the locomotive duty of a ton of coals would be reduced to 1,425 miles. Taking this as a basis of the calculation, and allowing ¼ of a ton of coals per horse power as spare fuel, the tonnage necessary for the fuel and machinery on a voyage from England to New York would be 3.70 tons per horse power, which for a vessel with engines of 400 horse power would be 1,480 tons.

If greater average speed were attainable, the resistance would be increased, and the consumption of fuel per mile be, likewise, increased; therefore, the practicability of the voyage would not be rendered greater. If it be assumed, that greater speeds might be attained with the same consumption of fuel per mile, the following table will exhibit, for the several rates of speed expressed in the column A in miles per hour, the tonnage of the vessel which would be occupied by fuel and machinery, allowing, in all cases ¼ of a ton of coals per horse power as spare fuel. The first column A expresses the speed in miles per hour; the second B expresses the coals in tons per horse power, exclusive of spare fuel; the third column C expresses the tonnage per horse power necessary for coals and machinery, including spare fuel; and the fourth column D expresses the actual stock of coals necessary for a vessel with engines of 400 horse power, and ¼ of a ton of spare fuel per horse power.

A	B	C	D
7¼	2.45	3.70	1,480
7½	2.37	3.62	1,448
8	2.28	3.53	1,412
8½	2.09	3.34	1,336
9	2.00	3.25	1,306

Dr. Lardner further explained, that, although from the nature of the projection used on maps, the coast of Nova Scotia appeared to be out of the direct line between England and New York, such, in fact, was not the case: a string stretched upon a globe between Bristol and New York would pass over Newfoundland and Nova Scotia. It appears, therefore, that to touch at Nova Scotia, as recommended, it is not necessary to deviate in the slightest degree from the shortest course to New York.

EXCURSION TO HANHAM.

The Directors of the Great Western Railway having invited the members of the Association to view the tunnel and cuttings between Bristol and Keynsham, Friday was fixed for the excursion. The Directors had provided water conveyance for the whole party, under the direction of Captain Claxton, and the embarkation took place near the bridge. There could not have been less than from fifty to sixty boats full of company; and though the morning was somewhat overcast, the general effect of the scene, of the flags, music, and assembled thousands, was in a high degree exciting. After some little confusion in marshalling the procession, the party proceeded to Wick, where the company disembarked. After inspecting the works they re-embarked at Hanham, where refreshments had been provided, and returned without accident; science having been, naturally enough, forgotten on this day of relaxation and enjoyment.

EXCURSION TO PORTSHEAD.

While one party, as above noticed, proceeded up the river on a pleasure trip to Hanham, another embarked on board the *Killarney* steamer, placed at the command of the Association by the liberality of the navigation company, and descended to Portshead. With the latter, science was somewhat more attended to. During the voyage Mr. Conybeare explained the stratification of the banks, which lasted until the arrival at Hungroad, where a member of Mr. Bright's family invited them to breakfast. The party here divided, and those members who partook of Mr. Bright's hospitality were gratified by the inspection of his collections. They also inspected the tide gauge constructed in his grounds; and being informed that Mr. Miles's gallery of pictures, at Leigh Court, would be thrown open to members of the Association, the party, after breakfast, proceeded thither, where also a *déjeuner à la fourchette* awaited them. The other members continued their voyage round the Holms. It was seven o'clock before the *Killarney* returned to the basin.

MEETING AT THE THEATRE.

The Theatre was again fully attended on this evening. The Marquis of Northampton addressed the meeting, recapitulating some of the benefits rendered to science by the British Association, and mentioning Lord Nugent's paper as a welcome proof of the increased attention which its proceedings excited among those of every class. He then particularized with high praise the geological discoveries of Mr. Cross, (see report of the Thursday's proceedings of Section C), and took occasion to congratulate Dr. Buckland on the completion of his great work, a copy of which had that morning been laid before the meetings.

Dr. Buckland then gave a highly interesting lecture on the marks of the footsteps of animals preserved in different strata. The attention of geologists had been first directed to these remarkable impressions, by the discovery of such marks in sandstone in Dumfriesshire; these were ascertained by Dr. B. to have been made by a tortoise. Since that time others have been discovered at Hilburghausen, in Germany. These are of four different animals, one of the marsupial kind, remains of which had been previously discovered in the oolite formation. Very extraordinary footsteps had been also discovered by Professor Hitchcock in America; some of these had been ascertained to have been made by an immense bird, the step of which was six feet in interval. The footmarks of crabs had also been observed in oolite, near Bath. Also stones had been observed, which must have been rubbed by animals, whose remains are now fossil, from their polished surface resembling that now produced by animals in the field or in caves.

SATURDAY, AUG. 27.

OPENING OF THE CLIFTON SUSPENSION BRIDGE.

This took place at an early hour: the accident to the iron bar previously drawn across the river, having, with great exertion, been successfully remedied. A procession proceeded to Clifton under the direction of Lieut. Claxton, R.N., with the usual insignia and decorations; and the concourse of spectators was immense; the gaiety of the spectacle being brightened by the picturesque nature of the scene and the beauty of the weather. Among the gentlemen present were Lord Sandon, Sir T. D. Acland, and Mr. Brunel, sen., the engineer of this magnificent work. The Marquis of Northampton laid the first stone, after the customary ceremonies, which he followed with a short and pertinent address. After this, the principal guests adjourned to a public breakfast. The whole proceedings went off with great spirit.

GENERAL MEETING.

The General Committee assembled at twelve, and the deliberations continued until five o'clock. It has been our practice, on former occasions, to publish no more of the transactions on these occasions than what it was deemed advisable to communicate to the subsequent General Meeting; but the ruling body of the Association has, on this occasion, made the deliberations of the Legislative Committee fair subjects of comment, by admitting to the debates gentlemen connected with the public press, not otherwise entitled to be present. Far from questioning the propriety of this, we are convinced that the time has come when the British Association has acquired such importance as to demand that vigilant public attention should be paid to its management. Its strength is due to public opinion; and to that public opinion, for the exercise of its strength, it is strictly responsible. Should it ever happen that the legislative power should be transferred to an executive council, or to any secret committee of revision, the strength of the Association would be instantly destroyed, the confidence on which it rests would be gone; and those who might have aimed at securing a monopoly of power would find that there was no power left for them to monopolize.

The first business was the Report of the Committee of Recommendations. The sum devoted to the encouragement of scientific inquiries during the ensuing year exceeds 2,700*l.*!

Section A.—Mathematical and Physical Science.

250*l.* for the discussion of observations on the tides; at the disposal of J. W. Lubbock, Esq.

150*l.* for observations on the tides in the port of Bristol; Rev. W. Whewell.

70*l.* for deduction of the constants of lunar nutations, under the direction of Sir Thomas Brisbane, Dr. Robinson, and Mr. Baily.

30*l.* for hourly observations of the barometer and lock bull hygrometer; Mr. Snow Harris.

100*l.* for the establishment of meteorological observations on an uniform plan, and experiments on subterranean temperature. Committee of last year, reduced to Rev. Prof. Powell, W. S. Harris, Esq., Colonel Sykes, and Professor Phillips.

500*l.* for the procurement of data depending on very accurate measurements of points situated on two straight lines at right angles to each other, for exact determination of the question of permanence or variability of the relative level of the land and sea. Committee: Messrs. Greenhough, Lubbock, Mackenzie, Sedgwick, Stevenson, Whewell, Robinson, Bayley, Griffith, Colly, Cubitt, Portlock, and De la Beche. Secretary, Mr. Whewell.

100*l.* for experimental investigations on the form of waves as influenced by the effect of winds, and the effect of the form of a canal, and the manner in which the wave is produced; John Robison, Secretary R. S. Ed.; and J. J. Russel.

500*l.* for reductions of observations in the Histoire Celeste, and Vol. IX. Acad. des Sciences, 1789 and 1790; Messrs. Lubbock, Airy, Baily, and Dr. Robinson.

150*l.* for experiments on vitrification; Drs. Turner and Faraday, and Rev. W. V. Harcourt.

80*l.* for the construction of a rock salt lens; Sir David Brewster.

Section B.—Chemical and Mineralogical.

50*l.* for researches on the specific gravity of gases; Drs. Henry, C. Henry, and Dalton.

30*l.* for researches on the quantities of heat developed in combustion and other chemical combinations.

15*l.* for researches on the components of atmospheric air; Dr. Dalton.

24*l.* 13*s.* for the publication of tables of chemical constants; Professor Johnstone.

60*l.* for researches on the strength of iron made with hot and cold air blasts; Messrs. Fairbairn and Hodgkinson.

Section C.—Geology and Geography.

20*l.* for experiments on the quantity of mud suspended in the waters of rivers; Rev. James Yates, Messrs. De la Beche and Rennie.

30*l.* for special researches on subterranean temperature and electricity; R. W. Fox, Esq.

50*l.* for researches on the nature and origin of peat mosses in Ireland; Colonel Coleby.

Section D.—Zoology and Botany.

25*l.* for experimental researches on the growth of plants under glass, and excluded from air, according to the plans of Mr. Ward; Professor Henslow.

Section E.—Medicine.

50*l.* for renewed grant to the committees appointed to investigate the subject of the anatomical relations of veins and absorbents.

50*l.* for the renewal of a grant to the committees appointed to investigate the subject of the motions and sounds of the heart.

25*l.* for researches into the chemical constitution of the secreting organs; Drs. Roget, Hodgkin, and Turner, and G. O. Rees, Esq.

25*l.* for investigations on the physiological influence of cold on man and animals in the Arctic regions; Mr. King.

25*l.* renewed grant for the investigation of the effects of poisons on the animal economy; Drs. Roupell and Hodgkin.

25*l.* renewed grant for the investigation of the pathology of the brain and nervous system; Drs. O'Beirne, Green, Macdonald, Messrs. R. Carmichael, R. Adams, and O. Smith.

25*l.* for the investigation of the physiology of the spinal nerves; Drs. Harpey and Broughton, and E. Cock, Esq.

Section F.—Statistics.

150*l.* for inquiries into the actual state of schools in England, considered merely as to numerical analysis; Colonel Sykes, and Messrs. Hallam and Porter.

Section G.—Mechanical Science.

50*l.* for an analysis of the reports of the duty of steam-engines in Cornwall; Messrs. J. Taylor, G. Rennie, and Cubitt.

REPORTS IN SCIENCE.

Section A.—Captain Sabine to communicate a continuation of his report on the magnetism of the earth.

Mr. Lubbock to report to the next meeting the result of the deliberations of a committee appointed to consider his proposition for the construction of new empirical lunar tables. Committee: The Astronomer Royal, Professors Rigaud, Challis, and Sir W. R. Hamilton, Messrs. Baily and Lubbock.

Section B.—Professor Johnston to report on the present state of knowledge of the chemical and physical properties of dimorphous bodies in their forms.

Section C.—J. Taylor, Esq., to report on the mineral riches of Great Britain, in relation more particularly to the metalliferous districts.

Section D.—Mr. Yarrell to report on the present state of knowledge of ichthyology.

Section G.—The Rev. W. Taylor, of York, to report on the various methods of printing which have been proposed for the use of the blind.

RECOMMENDATIONS OF RESEARCHES, &c.

Section A.—That Captain Sabine's magnetical observations on the west coast of Scotland form part of the next volume.

That application be made to the French Government for a copy of the best tide observations.

Section B.—That Rev. Mr. Harcourt be requested to continue his experiments on the effects of long-continued heat upon mineral bodies.

Section C.—The attention of members is called to the discovery of plants of any kind in slate rocks of any age older than the coal formation.

The recommendations not involving pecuniary expenditure were then read. Henry Hallam, Esq., as Vice-Chairman of the Statistical Section, rose to direct attention to a remarkable omission. The Committee of that Section, on the motion of Lord Sandon, seconded by Baron Dupin, had recommended that application should be made by the Association to the East India Company and the Board of Control for the obtaining an accurate census of the British possessions in Bengal, on the importance of which it is unnecessary to offer a syllable of observation. This recommendation had been rejected by the Revising Committee, and some inquiry was made as to the cause.—Professor Whewell *denied the right of making any such inquiry*, and stated, that there was *no appeal from the decision of the Revising Committee*, limiting the rights of the general body to the acceptance or rejection of any grants proposed by the Committee of Recommendations.—Col. Sykes said, that he had gone along with Professor Whewell in supporting the laws, which denied to so fluctuating a body as the General Committee the right of originating recommendations; but he thought that it had, and ought to have, the power of judging in appeal, when a recommendation unanimously sanctioned by a Sectional Committee had been rejected by the revising body.—Sir W. R. Hamilton strenuously supported the right of appeal to the General Committee, describing the obvious danger of intrusting absolute power to a secret and irresponsible body; but he was opposed to the particular vote, because it might be supposed to have a political tendency.—Baron Dupin denied the political tendency of the recommendation, and dwelt very strongly on the national stigma affixed to England by the utter neglect of Indian statistics; the differences in the estimates of the Hindú population under our government varied to the extent of more than thirty millions. At the suggestion of Lord Sandon, the motion was withdrawn, as likely to produce dissension in the body without any compensating result. This was accordingly done, it being previously understood that the right of appeal to the General Committee had been tacitly conceded.

The determination as to the place of meeting for next year gave rise to a long and rambling discussion. Invitations had been received from Liverpool, Manchester, Newcastle-upon-Tyne, Birmingham, Worcester, and Leeds. The choice lay between the first-named places, and the accommodations and inducements offered by both were nearly equal. The Rev. E. G. Stanley, in advocating the claims of Manchester, dwelt particularly on its possessing a Statistical Society, to which Liverpool itself was indebted for the best account of its state of education, and a Mechanics' Institute, which ranked among the first in the Kingdom.—Professor Whewell said, that the Statistical Society was to him "a menace rather than a lure," and he spoke in somewhat disrespectful terms of Mechanics' Institutes. Fortunately, the great majority of the members felt that the topics thus strangely and invidiously dragged into debate were of too much importance to be discussed inci-

dentally, and the subject was allowed to pass without comment.†

It was, at length, finally decided in favour of Liverpool as the next place of meeting by a great majority; that the time should be rather later in the year than on the present occasion; but the precise day was not fixed. It was, however, understood that it should be in the month of September.

The office-bearers chosen for the meeting in 1837, were the Earl of Burlington, *President;* Dr. Dalton, Sir Philip Egerton, Rev. E. G. Stanley, *Vice Presidents;* Dr. Charles Henry, Mr. Parker, *Secretaries.*

Mr. Murchison was appointed General Secretary to the Association in the room of Mr. Baily, who resigned.

Saturday Evening.—It is not our purpose, and it never has been our custom, to give a report of the speeches and votes of thanks, with which it is usual to wind up the proceedings. These are matters of course, and, though flattering to individuals, of no public interest. We cannot, however, but record our satisfaction at the public recognition of the natural connexion existing between literature and science by the placing of one of the resolutions in the hands of Mr. Moore; and we cannot better conclude our report than heartily joining in his wish, that the British Association may become the means of uniting all classes of philosophers, all parties of this empire, and all the nations of the earth, in the bonds of intellectual harmony.

OUR WEEKLY GOSSIP ON LITERATURE AND ART.

With the present week we close our report of the proceedings of the Bristol Meeting. Its principal features and minor details have been so fully dwelt upon in their proper place, that we have little left to say in addition to the few comments we felt ourselves called upon to make last week. But one step has been taken consequent to the proceedings of the Association, to which we must here advert with peculiar satisfaction. It appears, that many efforts were made to bring the subject of Education before the public—that lectures were given and well attended—and that on Monday, the 21st, a meeting was held, at which Mr. T. Wyse, M.P. for Waterford, presided, when it was resolved—that an Educational Committee should be formed, independent of the British Association, but holding its meetings at the same time: that whereas the Statistical Section confined itself to the collection of facts, this new Society should concern itself with the examination of results and measures: that the following members of the British Association should form the Committee, with leave to add to their numbers:—Thomas Wyse, Esq., M.P., Rev. E. G. Stanley, Mr. W. R. Greg, Mr. Romilly, Mr. James Heywood, Dr. Macartney, Mr. J. M. Morgan, Mr. John Isaac Hawkins, Dr. Lant Carpenter, Mr. James Simpson, Dr. Jerrard, Dr. Prichard, Mr. William Rathbone, Mr. Hovendon, Mr. C. B. Fripp, Dr. W. C. Taylor, Mr. Thomas Coates; and that a meeting should be held in the year 1837, at Liverpool, on the Saturday preceding the week appointed for the assembling of the British Association.

Now, we heartily agree that it is desirable that "the objects, means, and results of education should be carefully and systematically investigated;" but, as in truth no member of the Committee can have any doubt on the latter subject, we would have had the basis of this Society laid broader and deeper, and made to rest upon a declaration, in which the result should have been assumed. We would have had the bond of fellowship a declaration, that it is the bounden duty of the nation to provide for the education of the people; this might with propriety have preceded the first resolutions as they now stand. Information might then have been sought by following out the one, as to the best means of carrying into effect the other. The whole proceeding, however, seems to have originated in the impulse of the moment; but we fancy we see in this association of Catholics, Protestants, and Dissenters (for it was observed, that each of these classes had more than one representative present)—of gentlemen from north, south, east, and west, the germ of many Local Committees, all we trust to be found hereafter co-operating with a Central Committee, whose office it shall be to bring all the moral energy of this great country to bear upon Parliament, and force upon its consideration, as its first great duty, the education of the people. For the accomplishment of this purpose we are aware that funds will be required; paid officers must be employed, and the whole proceeding systematically organized. We have been so long labouring for the good cause, that we have had many opportunities of estimating the support likely to be given to such a Committee, and it is our firm opinion, that it would be heartily and liberally supported, from one end of the kingdom to the other.

We insert the following letter with much pleasure. We know that a great deal of anxious curiosity existed to hear the further report of Mr. M'Gauley's experiments on a subject which has excited so much attention at Dublin, and we gave, therefore, special directions to procure a very full report. It was, however, equally our duty to publish the commentaries.

To the Editor of the Athenæum.

Sir,—I am aware that the affairs of individuals are rarely of sufficient importance to claim the notice of the *Athenæum*—I trust, however, that in the present circumstances you will pardon me, and insert a few lines. On my return to Dublin yesterday evening, the numbers of the *Athenæum*, received during my absence from Ireland, were handed to me, and, on perusing the proceedings of the British Association at Bristol, I learned, for the first time, that Professors Ritchie and Stevelly had addressed the Physical Section on the paper I had read before it. I greatly regret that these gentlemen thought proper to defer their observations until after I had retired from the Section, as it deprived me of the opportunity of showing the injustice of Professor Ritchie's very bitter, uncalled for, and—as I have no hesitation in believing the abstract you have yourself published will demonstate—unfounded attacks. I might, also, while I convinced Professor Stevelly that I was not ignorant of those very simple and ordinary contrivances which everybody knows, have reminded him that, particularly in electro-magnetic experiments, the planning and the execution of mechanical contrivances are extremely different; I would also have recalled to his remembrance, when he spoke of attractive power at one-eighth of an inch, what, I confess, I thought plain enough, that the experiments submitted to the Section were intended to test the relative, and not the absolute, efficiency of electro-magnetical arrangements; and that, although he insinuates that an electro-magnet of 1000 lb. lifting power may be considered as a very successful experiment, electro-magnets of vastly superior power have long since been obtained.

Your obedient Servant,
J. W. M'Gauley.

79, Marlbro' Street, Dublin,
Sept. 1, 1836.

We may take this opportunity of correcting our announcement of the coming meeting of the Association of German Naturalists at Jena; this commences on the 16th of September, and closes on the 26th.

Our friends the magazines must be contented with scanty mention this month. For the most part, indeed, they are "much as when we last inquired." *Blackwood* vibrating between politics and poetry; *Fraser*, learned, poignant, and varied; the *New Monthly*, an amusing miscellany; the *Old Monthly* somewhat the better for the last of its one thousand and one changes; the *Gentleman's Magazine* grave, but not dreary, in its antiquarianism; The *Metropolitan* attractive in right of its wholesale extracts from books that are to come; and the *Monthly Repository* welcome for its fearlessness and freshness.

The interest which has been excited in the English world of art and science, by the exquisitely beautiful style of engraving, by which it has been proposed to illustrate our medallic history, has induced us to prepare a slight sketch of the rise, progress, and present state of the art, to be accompanied with an illustrative engraving. It is almost needless to remind our readers, that the proposed design of publishing a numismatic work, similar to the magnificent 'Trésor' of M. Collas, (now successfully proceeding in France,) was laid before a committee of the House of Commons, (see *Ath.* Nos. 451 & 452,) and recently recommended to the notice of a tribunal more strictly scientific, the British Association, (see *Ath.* No. 461, Mr. Greenough's speech, p. 597). We, have made arrangements for the appearance of the paper and engravings in question, on the 1st of October.

† During the previous discussions, a gentleman rose to address the Chairman; but it was decided, that he could not be heard, as he was not a member of the Committee. At the Dublin meeting a separate book was kept for those who claimed to be admitted members of the Committee, in which they were obliged to enter their qualifications before receiving a ticket of admission. Had the same course been pursued in Bristol, this very painful scene might have been avoided. When we consider the very important functions of the legislative body of the Association and the rarity of its meetings, it is unnecessary to dwell on the importance of scrutinizing the qualifications of its members. The requisites, at present, are a professorship in a university, delegation from an office in a philosophical society, a contribution to the Transactions of a philosophical society. It would, perhaps, be advisable to make some slight addition,

MUSIC AND THE DRAMA

NEW PUBLICATIONS.

The gravest and greatest work of those which lie on our table, is the *Gresham Prize Composition*, No. 5, a 'Magnificat,' by Mr. C. Lucas. The well-skilled judges who examine and decree in this yearly question, could not award the palm to a work lacking skill and science. In the composition before us, we accordingly find them, but nothing more: its separate movements are all cast in the ungracious form of canons, in which cleverness of treatment is made to atone for barrenness of subject. Why, let us ask Messrs. Horsley, Crotch, and Stevens, in place of servilely copying the ancient church mode of writing, should not our aspirants imitate or originate some style more welcome to ears overflowing with luscious melodies and striking harmonic contrasts? Surely, there is no more unseasonable or pernicious heresy than *formalism*, whether in art or literature. Had Palestrina written for the *Gresham Prize*, we cannot but believe that he would have availed himself of every legitimate resource of his art, for the emphatic utterance of his grand inspirations. But "the three" will, perhaps, raise a question on our word *legitimate*. Do they then mean to set aside as models the works of our own noble cathedral writers of a later date than Bird and Tallis—the fugues of Handel and Bach?—and, considering that the highest excellence in the church style lies in a puritanical rejection of all modern inventions, are they expecting or prepared for a revival of all the coxcombries and quiddities of the old school—of *fancy scores*,† which shall amuse the eye, no matter how far the ear fall short of being satisfied? If these be their principles, instead of bidding art advance on a path opened out by our forefathers, they make a mummy of her,—a curiosity fit only for the glass cases of a museum. We are glad to see that our argument has been ably advocated in a recent number of the *Musical World*.

We must take a long breath, before we can condescend to the vanities of our own day, after having communed with such a learned and correct personage as the *Gresham Prize Anthem*. The next work which comes under notice, is a collection of canzonets, by their elegance and manner claiming to be ranked among those of the newest Italian school: '*Six Songs*,' by J. Lodge, Esq., *the words written expressly for this work by Mrs. Hemans*. They are all graceful: the '*Song of a guardian Spirit*,' perhaps, deserves a higher epithet of praise: and the '*Wandering female Singer*,' though it contains not a new note, is likely to please by the plaintive expressiveness of its melody. Of the two spirited songs, which this set contains, '*The Muffled Drum*' is by much the best, and the '*Boat Song*,' which closes it, is sweet and flowing in its *refrain:* a true piece (to speak precisely) of *lake* music.

Mr. M'Murdie's '*Like to the falling of a star*,' is just so much manlier and quainter than Mr. Lodge's canzonets, as King's old words are than Mrs. Hemans's lyrics. We like this song much—it almost reaches the affecting in the suitability of its music to its poetry. The next on our list, is Mr. Kellner's '*Blind Mother*'—the music was originally written for '*The Flower Girl's Song*,' in 'The Last Days of Pompeii'—but, in consequence of some difficulty in obtaining permission to publish those words, has been fitted anew with lines in proper lengths and of the proper character, by the Rev. H. Caunter. There are sweet phrases and passages in this cantata, but it must owe much to the singer. Miss Adelaide

† Every musician and amateur has heard of the anthem to the words, 'And there was a rainbow round the throne,' in which the notes were so arranged in the score, *as to form an arch.*

Kemble was the artist by whom it was introduced to the public.

The composers of the next heap of songs must be satisfied with little more than an enumeration of their works. M. Hermann Bonn's '*Blind Boy*,' is, on the whole, expressive. Mr. G. Loder's duet, '*The Child and the Hours*,' reminds us of Bishop's '*Pretty Page*,' without its sweetness. Mr. Dyer's two canzonets, '*Separation*' and '*Marian*,' are difficult to characterize; there is, however, an attempt at writing in them. Miss Augusta Cowell's two songs, '*Curl ye sweet Flowers*,' and '*The Ocean Rover*,' and her trio '*Fathoms deep beneath the Wave*,' (the words from that pretty masque in 'The Pirate,' which formed part of Magnus Troil's revel,) rely on their melodies for producing effect: the second, though simple, is very sweet. Mr. Newson's '*Yonder Bark*' was sung at the Concerts of the British Musicians. The lowest of the pile are Miss Eliza Porter's '*Chamois Hunters*,' and Lady Augusta Kennedy Erskine's '*'Tis true I love thee*.'

Our show of instrumental music, passing over one or two pieces, which courtesy persuades us not to notice, consists, alas! of nothing more substantial than Quadrilles, Valses, and Galoppes. One lady has turned half a dozen of Corelli's Gigas and Allemandes into quadrilles,—what will female ingenuity next effect? and Mr. Bach has endeavoured to prove himself worthy of his noble name, by some clever and careful modulation in his two *Valses sentimentales*, *L'Amata e la Speranza*; the second we like best; his galoppes are sprightly; but Auber's tune in 'Gustave,' is the *one* tune for this rapid and flippant dance. We have purposely reserved Mr. J. Zeugheer Herrmann's *Second Set of twelve Waltzes* to close our notice withal, that we may close it with praise. The most advanced musician need not disdain to study and adopt these, especially the first, sixth, seventh, ninth, eleventh, and last, which are all admirable in the distinctness of their character, the expressiveness of their melodies, and the sound, manly writing they contain. We know of nothing better in modern music, and strenuously recommend them to all whose refined and instructed taste refuses to be contented with merely "sounding brass and tinkling cymbal."

NEW STRAND THEATRE.—The steadily increasing prosperity of this establishment, under its present management, may fairly be taken as a proof that, however numerous theatres may be in London, where there is no lack of rational entertainment there will be no lack of audiences. It has a few very fair actors to boast of, with Mr. W. J. Hammond at their head; and while he continues to act as well as he has hitherto done, and to manage as well as he has hitherto done, and while two such industrious and sprightly authors as Messrs. Brownrigg and Jerrold (notwithstanding the close similarity of their styles) continue to write for this theatre, we think there is no ground to fear that it will prove a losing concern. Mr. Brownrigg's last "Burletta of Adventure," as he calls it, is a famous bit of bustle and fun in five parts, wherein the incidents crowd upon one another like bees. It is entitled the 'Perils of Pippins; or, the Man who could'nt help it,' and it consists of a series of amusing dilemmas, into which the said *Pippins* is caused to fall by his being a creature of impulse; a man who gives as a reason for everything he does, that "he could'nt help it." We shall not weaken their effect by detailing them beforehand, but content ourselves with recommending those whom business keeps in town at this holiday season to seek their pleasure at the Strand Theatre; upon their return from which they will be constrained to own, that they have enjoyed a hearty laugh—if for no better reason, at least because "they could'nt help it."

MISCELLANEA

New Edition of Shakspeare.—We are requested to state, that the new edition of Shakspeare, advertised by Messrs. Scott, Webster, and Geary, as containing "a glossary, an account of each play; and a memoir of the author, by the Rev. W. Harness," is not edited, nor in anywise under the superintendence of that gentleman—its proprietors having merely availed themselves of a life, written by him, and published many years ago.

Sandstone of Hildburghausen.—M. de Blainville is of opinion, that the impressions left in the sandstone of Hildburghausen, and which have lately caused so much discussion, are the result of vegetable matter; which, if true, considerably decreases the interest they offer. We are not, however, in possession of the reasons which have induced M. de Blainville to come to this conclusion.

Fossils.—Dr. Klippstein, a German savant, who has been long devoted to geology, and who directs the researches in the environs of Alzei, (a little town of the Rhine Hesse,) has lately made a discovery. On digging twenty-eight feet under the soil, near Eppelsheim, and a league from Alzei, his workmen found a head of the *Dinotherium giganteum*, in perfect preservation. This is probably the most colossal of all antediluvian animals, and the existence of which was first pointed out by the learned zoologist, Dr. Caup. This head is six feet long, and three and a half broad. Near the head was also found a shoulder bone, supposed to belong to the same animal, both of which remains have not been met with elsewhere. Also at one thousand feet below the surface, in the mines of Anzin, an entire fossil palm tree has been found in an upright position. Its roots pierced the soil to a depth of several feet; its trunk measured thirty-six feet in diameter; and it is to be brought to the Museum of Natural History in the Jardin des Plantes. Professor Gossert, of Breslau, who has long and laboriously sought for a fossil flower among the lignites of Wetteravia, announces, that he has at last been successful, having procured one with its anthera covered with pollen, the grains of which may be distinguished.

Beet-root Sugar.—MM. Fies and Stanewald, of Quedlinbourg, have found out a method of extracting a perfectly pure and crystallized sugar, in twelve hours, from the pulp of beet-root, and in the proportion of ten pounds of sugar to one hundred pounds of beet-root.

On the Nature of various Species of Mortar. By Professor Fuchs.—Fuchs had studied the nature of various species of mortar, and proved that their induration depends upon the formation of silicates of lime, and sometimes also of alumina of silicates. These silicates retain the water, and acquire the hardness of masses of stone, while the hydrate of lime in excess is gradually united with carbonic acid; so that the hardened mortar may be considered as a mixture of carbonate of lime and of zeolite. Opal, pummice stone, obsidian, and pitch stone simply pulverized, form a good cement with hydrate of lime, but quartz and sand only produce a hydrated silicate upon the surface of each grain, which connects the mass, it is true, but which does not as speedily become solid. The finer the powder to which the quartz has been reduced, the more solid the mass becomes. If one fourth of lime be mixed with the quartz, and the whole be well calcined, so that the mass becomes a frith, if it be afterward pulverized and mixed with one fifth of lime, an hydraulic mortar is obtained, which attains sufficient hardness to admit of being polished. Felspar with lime hardens slowly, and only at the end of five months, but calcined with only a small quantity of lime it becomes much better. Water abstracts from this mortar six per cent. of potash. Common potter's clay, which is worth absolutely nothing when not calcined, produces when calcined with lime, a cement which hardens perfectly well, provided it do not contain much iron. Fuchs having found that *steatite* which had been heated to a bright red heat, would not combine with lime, and thence concluding that magnesia has a very strong affinity for silicious acid, tried the employment of calcined *dolomite* for the cement, instead of common lime, and found that it greatly surpassed the latter, both for the preparation of common mortar, and for that of hydraulic mortar: he even obtained good mortar of the latter kind, with calcined *marl*.—*Repertory of Patent Inventions.*

Union with England.—In no place were the disturbances carried to a greater height than in Glasgow. Addresses against the Union were presented by almost every description of persons. The Dean of Guild, and the Deacons of the tailors and cordwainers, were sent to Parliament to present the remonstrances of their fellow-citizens. The commission of the General Assembly of the Church appointed a fast, to implore Divine assistance from the impending calamity; on which occasion, Mr. James Clark, minister of the Tron Church, Glasgow, preached from these words in Ezra viii. 21, "Then I proclaimed a fast there, at the river of Ahava, that we might afflict ourselves before our God, to seek of him a right way for us, and for our little ones, and for all our substance." After the discourse was finished, the preacher said, "wherefore, up and be valiant for the city of our God." The people instantly arose, and along with their clergymen and fellow-citizens, paraded the town, and then burned the proposed Articles of Union at the cross.

Volcanic Eruption.—In the Annalen de Poggendorff, are the following details concerning the eruption of the volcano of Cosiguina, situated in the province of Nicaragua, in Mexico. It began on the 20th of January, and lasted for several days, accompanied by violent detonations, which were heard at St. Salvador, at Leon, and as far on the coast as Santa Fé de Bogota, two hundred leagues from Cosiguina. The quantity of cinders thrown up was destructive to the whole neighbourhood; so much so, that Union, the largest town near it, and on the western coast of the bay of Conchagua, was threatened with the fate of Herculaneum. At eight o'clock the mass of cinders advanced in a pyramidal form, and by eleven extended over the whole sky, accompanied by thunder and lightning, and plunged the whole town in darkness for forty-three hours. This fall of cinders had not ceased even on the 27th, and the inhabitants were threatened either by suffocation, or the falling of the roofs of their houses, or the being devoured by the wild beasts, who had taken refuge in the streets. An earthquake took place on the 22nd, which caused several people to fly to the mountains. Some of the cinders were carried by the wind as far as Jamaica.

Engraver's Acid.—A Mons. Deleschamps, a French chemist, has received a handsome reward from the French Society for the Encouragement of the Useful Arts, for an engraver's acid for the purpose of biting in steel plates, which has been in use in England for upwards of twenty years.

Surgeons, Apothecaries, and Barbers.—On the 14th September, 1588, the session of Glasgow requested the "Regents in the College, and the Members of the Presbytery, to take order with those who pretended to have skill in medicine and had it not." Mr. Thomas Myln, the town's chirurgeon, was accused of blaspheming the baillies, and calling the town the "hungry town of Glasgow," for which offence Sir Matthew Stuart, of Minto, Provost, and the Baillies, on 3rd June, 1589, adjudged the said Thomas Myln to appear at the cross, and confess his fault openly in the presence of the people; his pension to be taken from him and applied to making the causeway. In the following year, Dr. Peter Lowe, a native of Glasgow, after practising in various parts of the Continent, and being honoured with the appointment of ordinary surgeon to Henry IV. of France, returned to Glasgow, and obtained from king James VI. a charter, incorporating the practitioners of medicine in Glasgow, under the designation of "the Corporation of Surgeons, Apothecaries, and Barbers." It appears that at first there were but few members in the corporation, as at a meeting in the Blackfriars' church, on 3rd June, 1602, there were only seven present; and as Mr. Thomas Thomson declined to attend, "the brethren enacted that for his *contemptuous* disobedience he should lose what he had put in the box, and *take down his Basin*." From this expression it would appear that the surgeons of that day exhibited implements of their profession, similar to what barbers still do in country towns. As a farther proof of the paucity of members, "the brethren, considering that George Burrell, their officer, is the son of a burgess, admit him a member of the corporation, with liberty to profess the art of *Barberie* with simple wounds in the flesh, but debar him from meddling any farther." It appears from the records of the session, that when Dr. Lowe obtained the charter, there were only two midwives in the town, and that they were prohibited from attending any unmarried woman in the day time, until they had given intimation to a minister or a magistrate, and if in the night time, they were to take the oath of the mother who was the father of the child.

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